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Information Needs of Water Supply Management Final Report. Phase II. Evaluation of the Model State Information System

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Prepared for

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In general, all the information required for management of state water supply programs is contained in the Model State Information System (MSIS) files, and MSIS does produce the required Federal reports. The MSIS compliance determination procedure is operational in the hands of experience users, although many users indicate a need for more efficient data entry and preediting procedures. Through the use of the recently released Data Retrieval Subsystem, users are able to tailor reports from the MSIS files to their individual needs. The objective of this report is to identify the information needs of water supply managers in meeting their responsibilities.

KEYWORDS: *Informational retrieval, *Water supply, *Water quality management.

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Final Report
Phase II

Information Needs of
Water Supply Management

EVALUATION OF THE MODEL STATE INFORMATION SYSTEM

Prepared for:

U.S. Environmental Protection Agency
Office of Drinking Water
Washington, DC

Prepared by:

M. S. Ranade
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CONCLUSIONS

In general, all the information required for management of state water supply programs is contained in the Model State Information System (MSIS) files, and MSIS does produce the required Federal reports. The MSIS compliance determination procedure is operational in the hands of experienced users, although many users indicate a need for more efficient data entry and preediting procedures. Through the use of the recently released Data Retrieval Subsystem, users are able to tailor reports from the MSIS files to their individual needs. However, to ensure the successful operation of MSIS, it is necessary for the user to commit resources (particularly personnel) to the system.

MANAGEMENT SUMMARY

In April 1979, the U.S. Environmental Protection Agency (EPA) contracted with Research Triangle Institute (RTI) to perform an evaluation of the ability of the Model State Information System (MSIS) to meet user needs. In Phase I of the project, RTI prepared a detailed statement of the problem and developed a detailed evaluation plan. The implementation of the plan in Phase II includes (1) an evaluation of the data management needs of water program management and (2) an evaluation of how MSIS meets those needs.

To meet the objectives of Phase II, RTI developed a generic description of the activities of water program management. RTI conducted preliminary interviews with New York, Kentucky, and North Carolina, and EPA Region III, Pennsylvania Section, and prepared a report on the preliminary findings. After review of this preliminary report by EPA, final interviews were conducted with Alabama, Florida, Mississippi, Nevada, and Wisconsin, and this final report prepared. The participating states were chosen to represent a variety of organizational patterns, data management needs, and experiences with MSIS. The eight states and one Region included one completely independent computer system (NY); one largely independent computer system (WI); four states/Regions using MSIS compliance (FL, KY, MS, PA), and three states using MSIS inventory and manual compliance (AL, NC, NV).

Among the data management needs identified by RTI through analysis of these interviews are the following:

- The ability to maintain the federally mandated files in good order.
- The ability to produce required national and regional EPA reports.
- An effective and efficient procedure to determine compliance violations.
- An effective and efficient procedure to produce notification letters and other enforcement actions.
- Timely notification of compliance violations.
- Ready access to exhaustive data on a particular system, including a summary of compliance history and the response to enforcement actions.
- The ability to produce a variety of summary and in-depth reports on arbitrary fields across file lines.

RTI found that MSIS does maintain the federally mandated files in an effective manner and that it does produce the required Federal reports. Further, the data required for management of state water programs are contained in the MSIS files. However, it is not possible in all EPA Regions to fulfill regional reporting requirements solely through the use of MSIS. The MSIS compliance procedure (WAQC) is operational in the hands of experienced users, although many users indicate a need for more efficient data entry and preediting procedures. MSIS provides no mechanism for the production of letters of notification of violations to water systems, although some states have developed their own software to help meet this need. First notification of violations was never intended to be a function of MSIS, and since the compliance determination process was designed to be used in batch mode once a

month, an extensive effort would be needed to include first notification in MSIS. Through the use of the recently released Data Retrieval Subsystem, users are able to tailor reports from the MSIS files to their individual needs. Such reports could range from exhaustive data on a single system to summary or indepth reports across file lines.

The EPA Office of Drinking Water, acting with the MSIS User Support Group and the University of Cincinnati Computing Center, has continued to refine and enhance the MSIS system. However, to ensure the successful operation of MSIS, it is necessary for the user to commit sufficient resources (particularly personnel) to the system.

The following improvements are recommended to help MSIS more fully meet the needs of its users. First, to improve the usefulness of MSIS to the water program:

- Provide first notification of compliance violations.
- Provide reports required by regional, as well as national, EPA.

Secondly, to improve the operating efficiency of MSIS:

- Provide a more stable operating environment for MSIS by reducing the frequency and improving the quality control of new software releases.
- Simplify operationally the compliance determination process.
- Index, if not totally reorganize, MSIS documentation.
- Establish training procedures to allow smooth turnover among user personnel when necessary.

I. INTRODUCTION

After the passage of the Safe Drinking Water Act (SDWA) of 1974 (PL 93-523), the Model State Information System (MSIS), a decentralized batch data processing system, was put at the disposal of the states to aid with the increased administrative burden imposed by the regulations of the SDWA.

In the period since the original decisions were made concerning the shape and nature of the MSIS, water program management has been implemented in most of the state programs and has gained actual experience under the regulations. This experience has brought a change in perception regarding data management requirements within a program and has brought out the importance of a high-level review of the MSIS.

The U.S. Environmental Protection Agency (EPA) has contracted with the Research Triangle Institute (RTI) to evaluate the ability of MSIS to meet user needs. This project has two major interrelated thrusts: (1) an evaluation of those areas of water program management in which data management procedures are required and (2) an evaluation of how MSIS meets those needs.

A. Project Perspective

The objective of this project is to identify the information needs of water supply managers in meeting their responsibilities.

The approach adopted to achieve the project objective was to survey agencies having water supply management responsibilities at several locations. Interviews were conducted with staff at various organizational levels in these agencies, and the survey responses were synthesized into functional descriptions of the water supply management process. From these functional definitions, planning and control activities were analyzed to characterize the

informational requirements of decisions made in each of these areas. These can be usefully grouped into the four types of information employed in conventional decision analysis: (1) descriptions of alternative courses of action (i.e., options) that can be pursued by managers; (2) descriptions of circumstances that affect the efficacy of decision; (3) forecasts of the likelihood of all possible circumstances; and (4) descriptions of the expected outcomes of water supply managers' decisions.

The first type of information focuses on the available resources and their functional capabilities. For example, "perform annual detailed sanitary survey of each facility" might be one course of action being considered. Implied in the feasibility of this option is a set of resources--men and equipment--having specific capabilities. The first type of information, then, is generally expressed in terms of resource inventory data that support each decision alternative.

The second type of information focuses on describing prevailing conditions or the context within which management action is being considered. For example, an action might be being contemplated in highly populated watersheds that are subject to flooding conditions and that have some specified maximum number of water supply facilities. This second type of information would generally be expressed in terms of demographic, hydrologic, and economic activity data.

The third type of information deals with the likelihood of uncertain current or future conditions or events. For example, information might be needed about the likelihood that local drinking water consumption will be at various rates in some future time frame and about the future distribution of facilities. This third type of information typically involves making

forecasts and drawing inferences. These likelihood determination processes are a form of data processing that involves applying judgment or formal analytic techniques to the second kind of information listed above.

The fourth kind of information that charaterizes the decision process describes the effects of choosing different courses of action in each of the relevent decision circumstances. For example, if the decision is made to perform annual detailed sanitary surveys of all supplies in highly populated watersheds that are subject to flooding, the benefit might be a sharply curtailed incidence of drinking water health problems and an increased water quality control cost. This fourth kind of information is the output of some information transformation and requires knowledge of procedures for performing the appropriate transformations. For example, a specific "equation" relating population, flooding conditions, unit cost of performing a sanitary survey, and the survey frequency would enable a manager to optimize personnel resources in reducing the incidence of public consumption of contaminated water while minimizing the costs of identifying and restricting the use of contaminated water supplies.

The approach of identifying information needs for water supply management in terms of the decisions that are made by water supply managers provides a useful general framework for identifying specific information and MSIS data products that are, or would be, advantageous to water quality management. The approach ensures that the information identified is both useful and necessary. That is, the information identified with this approach does or would at least partially satisfy a definite water supply management need. This enables important distinctions to be made between information wants and information needs and between information needs and information currently collected.

These distinctions must be made to achieve a well-designed and efficiently operated MSIS.

One dimension of information that is not captured simply by characterizing water supply management decisions in terms of their information content is the quality of the needed information. The required accuracy of information and the frequency of update must be traded off against the cost of establishing and maintaining an information system. This quality of information issue distinguishes water supply planning decisions from water supply control decisions. Control decisions typically are based on detailed information that is both more accurate and more current than is the information needed in planning decisions. Planning decisions generally address relatively long time frames and have far-reaching impacts. However, recent information that is accurate in every detail may well be unnecessary. In most cases, good water supply planning decisions can be based on "average" or "representative" information that is expected to be relevant over a fairly long period of time, i.e., based on information that is not subject to rapid or frequent change.

In summary, the survey results presented in the following sections of this report were developed by focusing on the water supply management decisions. The interviews attempted to identify the information associated with these decisions. Distinctions were made between the information needed for planning and that needed for control purposes in order to infer the general information quality requirements.

B. Program Plan

According to the plan for the evaluation of MSIS, RTI would first develop a generic description (model) of water supply management and a preliminary

interview format based on this model to determine the allocation of resources to the various water supply management activities. Secondly, using this interview format, RTI would conduct a pilot study of three states/Regions. Through this pilot study, RTI would refine the interview format and then institute a final study of an additional five states/Regions with varying types of information system techniques. Finally, from the analysis of these interviews, RTI would hope to be able to recommend modifications to MSIS and to its use in order to help the system better meet the needs of its users.

The states/Regions chosen to participate in this study represent a cross section of organizational patterns, data management approaches, and experiences with MSIS. A summary of the program characteristics of these states/Regions is presented in Table I-1.

This report documents the implementation of this plan of study. Early in Phase II, RTI prepared a generic description of the activities of water supply management, and a preliminary interview format based on this description, and conducted preliminary interviews with four states/Regions: one state (New York) using its own state-developed data system; one state (Kentucky) using the full capabilities of MSIS; one EPA Region (Region III, acting in behalf of Pennsylvania) using the full capabilities of MSIS; and the state of North Carolina, which is in the process of implementing MSIS. After preparation and review of a report on this preliminary phase, RTI refined its interview format and conducted a final series of interviews with the states of Alabama, Florida, Mississippi, Nevada, and Wisconsin.

In the preliminary phase of this study, RTI personnel visited with the Bureau of Public Water Supply of the State of New York Office of Public Health on November 27 and 28, 1979; with the Pennsylvania Section of the Water Supply

TABLE 1-1. CHARACTERISTICS OF WATER SUPPLY PROGRAM

	Alabama	Florida	Kentucky	Mississippi	Nevada	New York	North Carolina	Pennsylvania EPA Region III	Wisconsin
Water Supply Program									
State Primacy	Yes	Yes	Yes	Yes	Yes	Yes	No	No	Yes
Program Scope	Full	Full	Full	Full	Full	Full	Full	SDWA[a]	Full
Computer System	MSIS	MSIS	MSIS	MSIS/State	MSIS	State	MSIS	MSIS	State/MSIS
Compliance Determination	State	State/Cty	State	State	State/Cty	County	State	EPA Reg. III	State
Compliance Method	Manual	DP-MSIS/ Manual	DP-MSIS	DP-MSIS/ State	Manual	Manual	Manual	DP-MSIS	DP-State/ Manual
Statistics									
Population (1970)	3,444,000	6,789,000	3,219,000	2,217,000	489,000	18,241,000	5,082,000	11,794,000	4,418,000
Number of Water Systems									
Community	750	2,500	680	1,350	325	3,700	3,600	2,500	1,247
Non-Community	500	3,500	520	950	397	11,000	9,500	8,000	12,000
Number of Samples									
Bact/Month	8,000	16,000[b]	2,500	5,000	1,500	NA[c]	3,500	11,000	4,500
Chem & Rad/Year	600	850	400	500	600	NA	NA[d]	NA[e]	400
Rad/Year			600	700	NA	NA	NA[d]	NA[f]	NA
Number of Laboratories									
Bacteriological									
State/Cty/Munic.	15	100	24	6	6	65	64	75	1
Private	0	41	5	10	4	49	69+	150	50
Chemical									
State/Cty/Munic.	1	15	0	1	1	7	259	359	1
Private	15	32	2	0	6	30			
Radiological									
State/Cty/Munic.	1	2	0	1	0	1	1	59	1
Private	0	2	1	0	1	0	0		

Note: NA = Not Available.

a SDWA is Safe Drinking Water Act only.

b Includes 7500 Bact. samples for which compliance is done by counties.

c State laboratory alone received >3000 bacteriological samples per month.

d Approximately 2000 communities have submitted the first set of chemical samples; 1000 have submitted radiological samples.

e 700-1500 lines of data per month. Each community sample may result in 10 or more lines of data.

f 500 lines of data per month.

g Total private and public laboratories.

Branch of EPA, Region III, on November 29, 1979; and with the Division of Sanitary Engineering of the Bureau of Environmental Protection, Commonwealth of Kentucky, on December 4, 1979. In addition, three visits to the Water Supply Branch of the Division of Health Services, State of North Carolina, were made by RTI personnel between July and December 1979. An analysis of the data management needs of Water Supply Management determined as a result of these preliminary interviews was presented in a preliminary Phase II report.

After reviewing comments on the preliminary report, RTI conducted the final series of interviews and prepared this final report. The states chosen for the final interviews included one state using MSIS for decentralized compliance determination via interactive terminals (FL); one state using MSIS for centralized compliance determination (MS); two states using manual compliance processes (AL, NV); and one state using a state-developed automated compliance process (WI).

RTI met with personnel of the Florida Department of Environmental Regulation in Tallahassee, Tampa, and Orlando, Florida, on July 15, 16, and 17, 1980. Interviews were conducted with the Alabama State Health Department on July 21, 1980, and with the Mississippi State Board of Health on July 22, 1980. Personnel of the Department of Human Resources of the State of Nevada were interviewed by phone in August and September 1980. Phone interviews were also conducted with the Wisconsin Department of Natural Resources during September 1980.

After completion of the final interviews, this report of all project activities and findings was prepared. Since the organization of the management of the water supply branches of state governments varies widely from state to state, a functional description (model) of water supply

management activities was used as the basic structure for the interview format. This functional model is presented in Section II of this report.

Section III of the report presents an analysis of the total information needs of water supply management by functional area. It should be noted that not all these needs are capable of being met by automatic data processing. Many "information systems" (files, with their associated input processes and uses) must continue to be maintained manually (obvious examples are correspondence files and laboratory log books). However, we have attempted to trace the flow of all information through the system in order to identify those points at which computer processing is necessary or helpful.

Section IV outlines the role of MSIS in state water supply management by identifying which information needs are met by MSIS and which fail to be addressed by the system. In addition, some perceived shortcomings of the present MSIS system are discussed.

In Section V, we present a summary of our findings and our recommendations to improve the usefulness of the system. Appendix A contains examples of report formats designed by the states we visited to fill their particular management needs. In Appendix B we discuss the relationship of the MSIS reports and procedures to the data needs identified in Section III. Appendix C contains the interview format used in the interviews with the states/Regions.

C. Acknowledgments

We would like to express our gratitude to the water supply departments in all the states and Regions we visited for their patience in answering our many questions and for helping us gain some understanding of water supply management and its needs.

II. STRUCTURE OF STATE WATER SUPPLY MANAGEMENT

In most cases, state water supply management resides as a department within the state Board of Health, with varying degrees of interrelationship with other state agencies regulating water quality (e.g., the state Environmental Control Board). The scope of involvement with local health units also varies considerably from state to state, from the local health unit having total responsibility for compliance determination to total EPA responsibility in nonprimacy states. A description of the water program characteristics in the states/Regions visited was presented in Table I-1.

A. Functional Model of Water Supply Management

In each case, we found the state water supply program to include most or all of the functions and activities outlined in Figure II-1. As a basis for discussion in this report, we have identified three broad functions within state water supply management: (1) the administration (management) of the state drinking water program; (2) the support and surveillance of the public water systems (with direct contact with the systems); (3) and compliance determination, enforcement actions, and recordkeeping. This classification scheme of functions is proposed not as a guide to actual administrative organization but rather as a basis for discussion in this report.

Administration of a state water supply program includes among its functions budgeting, program direction, coordination of interactions with other agencies (including the primary responsibility for the Federal and regional EPA reports), and promulgation and maintenance of state and Federal drinking water standards.

1. Administration of State Water Supply Program
   - Budgeting
     - Preparing applications for funding
     - Tracking of expenditures and accounting for funds received
     - Establishing priorities within budget
     - Administering PWS grants program
     - Billing for state services
   - Program direction
     - Program planning
       - Annual planning and 5-year planning
       - Emergency planning
     - Program implementation
       - Establishing operating procedures of staff
       - Directing and supervising program
     - Program evaluation
   - Coordination of interaction with other state, Federal, and nongovernmental agencies
     - Preparation of required Federal and Regional reports
     - Cooperation on joint projects
   - Promulgation and maintenance of laws and standards
     - Reviewing and promulgating Federal drinking water regulations
     - Developing and promulgating state drinking water regulations
       - Analyze and develop regulations concerning
         - Quality of sources
         - Drinking water quality
         - Surveillance of drinking water quality (sampling frequency, analysis methods)
         - Materials and additives standards
         - Plumbing codes
         - Cross-connection control
         - Prepare data and testify before legislature
     - Establishing and reviewing variances and exemptions

2. Support and Surveillance of Public Water Supply System
   - Engineering Plan Review and Approval
     - Review and approve plans for:
       - New water systems
       - Expansions of existing systems
       - Chemical treatment material and equipment
       - Cross-connection control
     - Develop standards for design
     - Advise consulting engineers and PWSs on sources and equipment
     - Collect data on proposed and completed construction

(Continued)

Figure II-1. Functional Description of State Water Supply Management

- Support of public water supply system
  - Training and certifying operators
    - Offer formal training programs
    - Offer informal on-the-job training
    - Manage certification program
  - Training and certifying of lab personnel
    - Offer training programs
    - Offer certification program
  - Providing technical assistance and emergency support
  - Provide technical assistance
    - Onsite support
    - Lab support
    - Promulgate emergency plans
    - Direct and coordinate emergency actions
  - Providing public health education
    - Respond to public complaint
    - Respond to special studies and public right-to-know inquiries
    - Make public health education efforts with regard to water quality
- Monitoring water sources and public water systems
  - Monitoring quality and output of sources of drinking water
    - Approve of sources
    - Sample and monitor sources
    - Protect watersheds and reservoirs
  - Monitoring public water system management and operational methods
    - Schedule and conduct sanitary surveys and inspections
    - Schedule and format operating reports
  - Monitoring collection and analysis
    - Monitor collection of water samples
      - Scheduling sampling
      - Prescribing and monitoring distribution of sample points
      - Prescribing and monitoring sampling techniques
      - Coordinating transportation of samples
    - Monitor analysis of water samples
      - Coordinating laboratory testing of samples
      - Coordinating laboratory reporting of sample data
        - Notification of operators of need to check-sample
        - Notification to state of analysis results

(Continued)

Figure II-1. Functional Description of State Water Supply Management (Continued)

3. Compliance Determination and Enforcement Actions, Recordkeeping

- Compliance determination
  - Processing data
    - Operating reports
    - Sanitary surveys and inspections
    - Lab inspections
    - Lab sample data
  - Determining violations of standards and codes
    - MCL violations
    - Sampling violations
    - Use of invalid sampling or analysis method

- Enforcement of regulations and standards
  - Notifying and taking appropriate actions
    - Oversee notification of operators
    - Oversee notification of public
    - Take legal actions
  - Tracing response to enforcement action
    - Monitor response of PWS to enforcement actions
    - Schedule further enforcement actions
    - Schedule technical assistance for PWS
    - Initiate variance or exemption
- Recordkeeping
  - Maintaining inventory of public water systems
  - Maintaining reports of sanitary surveys
  - Maintaining sample analysis results
  - Maintaining records of state approvals
  - Maintaining records of compliance violations
  - Maintaining records of enforcement actions
  - Maintaining records of variances and exemptions
  - Maintaining information flow within water supply management

Figure II-1. Functional Description of State Water Supply Management (Continued)

Included under budgeting are establishing priorities within the budget, preparation of applications for Federal and state funding of the state water supply program, accounting for funds received and tracking expeditures, billing for state services, and administration of the grants program for the public water systems.

The administration (management) of the state water supply program bears the chief responsibility for coordination of staff activities in projects involving other agencies (state, Federal, or nongovernmental) and for the preparation of the required Federal and regional EPA reports. It is also the administration's function to review and disseminate Federal drinking water regulations, to assist the state legislature in the development of state regulations, and to establish and review variances and exemptions for individual public water systems.

The direction of the state water supply program is probably the chief function of management. Annual and 5-year plans and emergency plans must be propared and reviewed, staff operating procedures established, and the ongoing program monitored. The manager is frequently directly involved in the development of program areas where special needs are perceived.

The functions defined here as "administrative" usually fall to the manager of the state program. However, depending on individual circumstances and administrative structure, many of these functions may be delegated to others within the department, while the manager finds himself/herself engaged in activities we list elsewhere. For example, in states where MSIS is installed, the required Federal reports can be generated from the computer files with little direct action on the part of the manager.

The second major functional area we have defined is the support and surveillance function of water supply management. We have included here both engineering plan review and approval and those activities that are usually delegated to field engineers. Again, we do not mean to imply that these activities should be delegated to these personnel, merely that we are using this classification as a basis for our discussion.

The engineering plans reviewed by the approval staff include plans for new water systems as well as expansions of existing systems. The review includes both chemical treatment material and equipment as well as cross-connection control. The staff advises public water systems and consulting engineers on water sources and equipment and advises the other units of the state water agency of proposed and completed construction.

Support of public water supply systems includes training and certifying operators and laboratory personnel, providing technical assistance and emergency support, and providing public health education. Public education includes response to public complaint and right-to-know inquiries as well as formal education efforts.

The monitoring of drinking water includes surveillance of sources, of public water system management and operational methods, and of collection and analysis methods. Sources of drinking water must be monitored for both quality and output in order to protect watersheds and reservoirs.

Public water system management is monitored by inspections and sanitary surveys and through regular operating reports. Although regular sampling of drinking water is performed by the water systems themselves, sampling techniques and schedules and the distribution of sampling points all need to be monitored. Analysis of water samples may be performed by state or private

laboratories, but the state frequently plays a role in coordinating the transportation of samples and sample bottles and the reporting of sample results by the laboratories.

The third major function we have identified in water supply management is the processing of data (recordkeeping), determination of compliance, and enforcement actions. We have grouped these activities together for our convenience in discussion here and realize they are implemented according to many different administrative schemes.

Compliance determination involves processing data (either manually or using computer assistance) from operating reports; sanitary surveys and inspections of public water systems; and laboratory inspections in addition to laboratory sample data. In monitoring sample data, violations of Maximum Contaminant Levels (MCL) regulations and mandatory sampling deadlines must be checked along with the certification of the laboratory and the analysis method used.

Enforcement includes notifying water systems and the public of violations, initiating various degrees of enforcement actions, and tracing the response of systems to determine the course of the enforcement process.

In states where the water supply agencies employ computer data processing, many of the recordkeeping functions are centralized in the computer files, although manual files are also kept for backup and to supplement the computer files. The computer can record all the federally required data concerning inventory, sanitary surveys, sample analysis, state approvals, compliance violations, enforcement actions, and variances and exemptions. If a computer system equivalent to MSIS is used, a large portion of the annual Federal reports can be generated directly from the computer

data, as can internal reports, which maintain the data flow within water supply management.

B. Resource Allocation Within Water Supply Management

Due to the complexity of state water management activities, and the diversity of management structures, in the limited time available in this study it was impossible to categorize completely the distribution of all personnel time. Table II-1 presents our best estimate of the distribution of personnel time in the states we visited into the major functional categories described in Section III-A.

As indicated in the footnotes to Table II-1, many factors affect the interpretation of the table data. The most significant is the difference in program scope from state to state. Since the Pennsylvania Section of EPA Region III has responsibility only for implementation of the Safe Drinking Water Act, only minimal resources are devoted to support and surveillance functions. In New York, Florida, and Nevada, a varying percentage of counties have "approved" status to make their own compliance determinations. The county personnel involved in the water program have not been counted in the table. In some states, particularly those performing manual compliance, it was extremely difficult to separate compliance determination activities from enforcement activities, since these are generally performed concurrently by the same personnel.

We had hoped in this study to distinguish variations in manpower allocation due to the use of MSIS or manual compliance. However, we have not been able to come to as definitive a statement as we could hope on this issue. There seem to be as many approaches to compliance staffing as there are states. Particularly in manual compliance determination, the personnel

TABLE II-1. RESOURCE ALLOCATION BY FUNCTIONAL AREA

Functional Area	Person-Years Allocated to Functional Area in State or Region Shown								
	AL	FL[b]	KY	MS	NV[b]	NY[b]	NC	PA[a] Sect	WI[e]
Administration									
Director/Asst. Director	1.5	0.6	2.0	1.0	0.2	1.0	1.0	1.0	
Engineer		3.5	0.6	0.6		3.9	4.0		2.6
Sanitarian/Environmentalist		1.0							3.6
Total	1.5	5.1	2.6	1.6	0.2	4.9	4.0	1.0	6.2
Support and Surveillance									
Director	0.2								
Engineer	3.3	13.1	8.8	8.6	1.0	16.1	17.0	1.4	9.8
Training Specialist	2.0	2.4	2.0			2.0			
Chemist		0.3	1.0						
Sanitarian/Environmentalist	1.9	2.2		1.0	1.6		3.0		13.9
Technican		0.5	1.0	1.0		2.0	6.0		
Clerk		0.4		1.0					
Total	7.4	18.5	12.8	10.6	2.6	20.1	26.0	1.4	23.7
Compliance and Enforcement									
Compliance									
Engineer	0.3	3.1	0.9	0.8		4.0	2.5	5.6	1.0
Chemist/Research Spec/Adm. Asst.						1.0	1.0		
Sanitarian/Environmentalist	0.8	5.6			0.9				2.0
Technican		2.0					0.5		2.0
Clerk	2.2		4.5	3.0		2.0		3.0	
Data Entry Operator			1.5	1.0			1.0		
Analyst/Programmer	2.0[d]	2.0[d]	2.0	0.5	0.2	1.0	1.5	2.5	2.0
Enforcement									
Engineer		1.7	1.7				2.5		2.5
Chemist		0.1							
Sanitarian/Environmentalist		5.0	3.0						3.3
Technican		0.1					0.5		
Total	5.3[c]	19.6	13.6	4.3[c]	1.1[c]	8.0[c]	9.5	11.1[c]	12.8
Total (All Functions)	14.2	43.2	29.0	17.5	3.9	33.0	40.5	13.5	42.7

[a] Authority only over Safe Drinking Water Act activities.
[b] Some or all counties are "approved" to conduct compliance determination; county personnel are not included in this table.
[c] Compliance totals include enforcement activities.
[d] One or more positions currently vacant.
[e] Data for Wisconsin does not include clerical or data entry personnel.

requirements vary considerably according to the size of the state program, the staff available, and the effectiveness of the enforcement program to date. In states using MSIS compliance, where MSIS has not been operational for long or has not been running smoothly, duplication of effort is found in the keeping of manual compliance records in addition to MSIS records. These are usually felt to be temporary situations caused by slow computer turnaround in the face of time constraints, and a lack of enthusiasm for interpreting the WAQC output reports.

Those states successfully using MSIS for compliance generally have one data processing analyst and one water program specialist, both experienced in the use of MSIS, working together to ensure the smooth operation of the system. During the installation phase, and until the compliance module is running smoothly, these personnel spend up to 100 percent of their time installing the system, and integrating it into the operation of the water program. After the system is operational, perhaps 50 percent of the time of these key personnel is used to guide the operation of the system and tailor it to the needs of the particular state.

Good quality control of data input to MSIS has been found essential in order to minimize false violation records and the rerunning of bad data. In addition, effective procedures are required to translate WAQC output reports into a form usable by the enforcement staff.

Input quality control can include manually preediting the lab forms before keypunching, verification of the data after keypunching, and/or automated preprocessing of the data. Automated preprocessing can be accomplished by special purpose batch software as in Mississippi, which has its own customized preprocessor, Pennsylvania, which uses the MSIS Select to

tag potential MCL violations, or Kentucky, which runs dummy compliance each month. A second form of automated control is found in Florida, which uses remote terminals with editing capabilities for direct entry of the data into formatted input screens. A sample input screen is shown in Figure A-14, in Appendix A. Similar results could be obtained in a batch environment by using key-to-disk or key-to-tape data entry procedures, which also employ formatted screens with editing capabilities.

As a rule, the output of WAQC is examined by a member of the compliance staff for invalid violations before submittal to the enforcement officer. Many states have developed special report formats to aid in this task (see Figures A-5 through A-10 in Appendix A for examples).

Depending on the combination of manual and automated methods used for pre- and post-processing of the WAQC data and the size of the water supply program, from 1 to 4 members of the compliance staff are generally assigned to the MSIS team.

The successful use of MSIS in a state does require the committment of personnel resources to the system. However, those states experiencing sucess with MSIS compliance are of the universal opinion that the job done by the computer could not have been duplicated manually. This perception is reinforced as the network of reporting systems grows and more regulations come into force.

III. INFORMATION NEEDS OF STATE WATER SUPPLY MANAGEMENT

A. General Discussion

The identification of information needs within water supply management is at least partially dependent upon the individual program scope and organization. For example, a water supply program in which compliance determination is performed exclusively at the local level has somewhat different information needs from one in which all compliance determination is done at the state office. The internal organization of a department can also affect the perception of information needs; information flow is more visible when it must cross organizational boundaries.

The information needs identified in this report are based on a generic functional structure described in Section II of this report. The various activities comprising water supply management are outlined in Figure II-1 of Section II. We have used the term "information needs" in a broad sense both to cover needs for information content (satisfied, for example, by reports based on file data or other data products such as mailing lists) and to cover needs for data management tools (for example, procedures, input documents, computer software). Our meaning should be clear from the context.

Within each major function of water supply management as defined in Figure II-1, we describe here the information flow through that department, listing the information that comes into the department, the files maintained, and the information generated. We also attempt to list the information needs to accomplish the activities described in Figure II-1.

Italics are used to identify the data needs we feel may be at least partially met by computer generated data.

B. Administration of Water Supply Management

1. Data Flow

The manager (administrator) of the state program receives reports from the various files kept within the department on the status of all the various programs carried out by the department. He/she receives directives and requests from colleagues in the state government and regional and Federal EPA offices, as well as requests for special action in emergencies or for special programs.

In addition to correspondence files of daily activities, files maintained by the administrative office include budgetary and accounting information and data regarding state and Federal regulations and the determination of variances and exemptions. The administrator also has access to all the files maintained by the various branches of water supply management.

2. Information Needs

To carry out his/her budgetary function properly, the administrator needs to know the funds and personnel available, accurate and timely *accounting information*, and a track of expenditures through the various departments. He/she needs an accurate picture of the *status of the program plan*. If the water supply department is responsible for billing for state services, an accurate *mailing list* is essential.

In order to plan the programs for the water supply department, the administrator needs to know the available budget and resources. He/she must be able to evaluate the department's standing with respect to previous plans and goals. He/she receives external evaluations from the regional and Federal EPA; however, he/she must also have solid information on the *current size and status of water supply program*. This information may be obtained in *summary*

form or in *time trends* from internal data sources (inventory, sample, and violation files) or data sources external to water supply management (e.g., environmental data, U.S. Geological Survey (USGS), Army Corps of Engineers (COE), etc.).

In implementing the program plan and in establishing operating procedures, the manager needs accurate information on the *current status* of the state water supply program (for example, systems identified, systems reporting, systems in violation, certification programs, etc.). The manager needs prompt warning of potential problems through *time trends* and well-designed *summaries of past problems*. Again, an accurate *mailing list* is essential for maintaining contact with all public water systems. In order to coordinate repsonse to emergency situations, the administrator must have immediate access to *exhaustive, accurate, and timely data on individual systems* and *summaries by arbitrary fields across file lines*.

In coordinating interactions with other agencies, the adminstrator needs an accurate picture of *resources both within and outside his/her department*, as well as the interrelationships between internal and external sources of data (e.g., superimposed maps). In order to fulfill the reporting requirements and Federal, state, local and special requests, the manager needs access to the data required and a *mechanism to produce reports accurately with a minimum of effort*.

In order to put into operation and enforce the Federal and state laws and standards regarding drinking water, the administrator needs data on the *performance of public water systems (summarized by various categories)* and the *response of systems* (as summary and time trends) to *enforcement* actions.

Exhaustive data on individual systems is needed for the establishment of variances and exemptions.

In summary, managers require the following types of information:

- Immediate access to exhaustive data on a particular system in response to public complaint or in time of emergency or general review.
- The capability of producing summary data on arbitrary fields of interest across file lines.
- The capability of producing the required national and regional EPA reports.
- The capability of producing *ad hoc* reports in response to public inquiry or special need.
- Status reports on activities of various department (e.g., the status of all Public Water Systems on the required chemical sampling; the status of required public notifications of violations). The need for formal status reports has become more apparent as the mass of data involved has become more unwieldy and increasingly automated. In small-scale, manual systems, access to the activity log frequently satisfies the need for status information.
- Time trends of various data: contaminant levels, compliance history, etc.
- Mailing lists. Mailing lists can be very sophisticated tools for scheduling and data management, if carefully designed.
- Correlation of data in the water supply data system with files in other agencies. This is usually described as a future goal, as confidence in the reliability of the external files varies.

Examples of report formats developed to meet some of these management needs in the states we visited are contained in Appendix A. A mailing list developed by the state of North Carolina is shown in Figure A-1. Figures A-2, A-3, and A-4 are inventory summary reports. Figures A-7 and A-8 show the tracking of the status of required notifications. Figure A-13 is a milestone report produced by the Data Retrieval Subsystem. Figure A-15 shows the format

of a report on flouridation in the State of Mississippi produced by custom designed software from data in the MSIS files.

C. Support and Surveillance of Public Water Systems

The support and surveillance function of water supply management, as described in Section II, includes review and approval of plans, technical support of public water systems, certification and training programs, and monitoring of both operational methods and sample collection and analysis procedures.

1. Data Flow

The plan review staff receives requests and proposed engineering designs for new water systems and improvements to existing systems. They consult inventory data and the compliance history of existing systems, as well as information on source quantity and quality. Records are kept of plans approved and construction inspections. The plan review staff advises management on new standards for design and sends information on plans approved to the filed staff.

The field staff provide direct technical support and surveillance of the public water systems. They receive copies of operating reports, operator and laboratory certification records, plan approvals, sampling and MCL violations, and enforcement actions. In states using computer data processing, the field personnel generally receive a summary list of inventory data. They retain records of their sanitary surveys and inspections and forward copies of these records to the operator and laboratory certification files and the inventory file. In most states the central office staff also provides some level of support for public water systems by answering telephone questions about reporting requirements, by sending literature, and by other services.

2. Information Needs

In order to review engineering plans effectively, the approval staff need to know the *compliance history* and *source quality and output* for the public water system under question. *Time trends* and *summary lists* are needed to develop new standards for designs.

The certification and training programs for operators require accurate information on operator address, current certification, etc., as well as current information on the public water system.

Similar requirements hold for laboratory certification programs. Accurate *mailing lists*, and data from *operator files* and *inventory files* are necessary for certification and training. In responding to emergency situations, the field personnel need *detailed information on distribution systems and cross connections*, locations of surface water intake and wells, time of travel data on streams, and *names and addresses of responsible authorities*.

In order to monitor quality and output of sources effectively, information is needed on *records of approval* for new public water systems and *local watershed regulations*, and data are needed on the quantity and *quality of the source* water before treatment.

Field personnel need an *up-to-date inventory listing* on each public water system containing detailed *operational data* in order to monitor public water system management and operational methods. Records of previous *sanitary surveys* and *inspections* and *compliance history* are useful for setting priorities in scheduling inspections.

In order to monitor collection and analysis of samples, state personnel must have an accurate picture of the monitoring requirements for each public

water system and the *record of compliance* with those requirements as well as *detailed inventory data* on treatment processes. They need *accurate mailing lists* if sample bottles are sent through the state office. Accurate data on *laboratories' responsibilities for sampling* and *timely information on MCL violations* are needed to follow up on check-sampling requirements.

In summary, support and surveillance personnel, including both the engineering plan review staff and field staff, have need of the following data:

- Source quantity and quality, time trends, and summaries
- Detailed inventory data, including operational data and treatment processes
- Accurate mailing lists for operators, owners, and public water systems
- Operator certification data
- Records of approval
- Compliance history
- Records of previous inspections
- Data on laboratory certification and sampling responsiblity
- Timely record of sampling violations.

It is to be noted that, in general, field personnel are not enthusiastic about further dependence on computer generated data. Their experience has been that turnaround time for data input from the field to computer files is unacceptably high. Perhaps the greatest unmet information need is for first notification of MCL violations that the current MSIS system cannot yield. In addition, the logistics of disseminating computer reports from a central processing site to field offices precludes instant turnaround. Careful

planning with full participation by the field officers themselves is necessary to produce useful reports that reach the field in a timely manner.

Examples of reports used by field personnel in the states we visited are contained in Appendix A. Inventory summaries, as in Figures A-2 and A-3, are used in the states of Kentucky and New York, while Mississippi has developed a list of water systems not surveyed, as illustrated by Figure A-11. Wisconsin issues a Daily Exception Report (Figure A-12) to each district office listing those water systems with positive bacti samples.

D. Compliance Determination, Enforcement Actions, and Recordkeeping

As the third major function of water supply management, we have grouped together compliance determination, enforcement actions, and recordkeeping (see Figure II-1).

1. Data Flow

Under the recordkeeping function of water supply management we have included all the processing of data from the field and elsewhere: operating reports, sanitary surveys and inspections, operator and laboratory certification data, sample data from the laboratories, etc., and the organization of those data into files. These files include the inventory file, the laboratory and operator certification files, the approval file, the sample data file, and the file of variances and exemptions. The information in these files is used by all the offices within water supply management. In states employing computer data processing, much of the information flow within the water department as well as within the federally mandated reports can be produced directly from the computer files with software developed internally or with MSIS.

The compliance determination process involves checking sample data from the laboratories against the Federal and state standards, using data from the inventory file, operator and laboratory certification files, and variance and exemption files to determine compliance. The violations found are recorded in a violations file and routed to the enforcement office, management, and field personnel.

The enforcement office receives violation data from the compliance determination process and, at times, directly from the laboratories, and it consults its own records on response of systems to past enforcement actions. An accurate inventory file and mailing lists also are required. As appropriate enforcements actions are determined, they are communicated to the public water systems themselves, to management, and to field personnel. Logs are kept of past enforcement actions and of the response of systems to them.

2. Information Needs

The processing of the huge amounts of data necessary for the fulfillment of the Safe Drinking Water Act and Regulations requires well-designed data management tools, whether the recordkeeping process is manual or automated. *Input forms* must be *easy to code, to edit,* and *to punch,* and *procedures for data handling must be well documented. Files* and their maintenance procedures (software) *must be well designed* to capture all necessary data effectively and efficiently. To preserve file integrity, procedures must be provided to *edit data effectively* prior to entry and to *correct any invalid data* in the system at whatever stage it is detected.

Because of the variety of likely inquiries into water system data, some sort of report generator package compatible with system software would be a valuable tool. Standard, regularly scheduled procedures must be effective and

efficient and require a minimum of effort on the part of the data processing staff.

The compliance determination process requires *well-organized* and *well-documented data handling procedures*. The absence of good procedure documentation contributes to inconsistency in data handling and increases the difficulties of bringing new personnel up to speed in the data control process. An efficient *procedure* for *determining MCL violations* and notifying the enforcement officer in a timely manner is necessary, as are procedures for *recording sample data* and *determining monitoring and other violations*. In order to minimize monitoring violations, a list of the reporting status of the various public water systems would be very helpful. Good data control procedures are needed to *edit sample* data before entering it into the compliance process as well as for *correcting files* processed with erroneous data.

The enforcement officer needs *timely and accurate information on MCL and other violations* in order to initiate enforcement actions. An accurate *mailing list*, including telephone numbers, and efficient *procedures* for *notifying systems of their violations* is needed. Access to information on the inventory, variance and exemption files, and previous compliance records is useful for cross-checking violations. A good system for *tracking systems' responses to previous enforcement actions* is required for decisions on further action as well as scheduling technical support and advising management and field staff of the status of the various systems.

In summary, the recordkeeping, compliance determination, and enforcement functions require the following:

- Well-designed input and output documents and well-documented and efficient procedures.
- Efficient request procedures for *ad hoc* reports and scheduling for regular procedures.
- Well-designed file structures and maintenance procedures.
- Report generator to satisfy the variety of inquiries into water system data.
- Good data editing capabilities and procedures to correct invalid data generated by faulty inputs.
- Efficient and effective procedures for determining violations.
- Timely data on MCL, sampling, and other violations.
- Status reports on systems submitting samples, systems in violation, and systems' response to enforcement actions.
- Efficient procedures for notifying water systems, management, and field personnel of violations.
- Good tracking procedures for previous enforcement actions and the response of water systems.
- Access to inventory, variance and exemption, and previous compliance records.
- Accurate mailing list, including telephone numbers.

Examples of reports used by compliance personnel are included in Appendix A.

The role of MSIS in relation to these water supply management needs is discussed in Section IV of this report, and a summary of our findings and recommendations is presented in Section V.

Mailing lists including the PWS-ID (Figure A-1) are used in North Carolina. Inventory Summaries are shown in Figures A-2, A-3, and A-4. Violations reports (Figures A-5 through A-10) are used in practically all states. Those from New York and the Pennsylvania Section (Figure A-7, 8) include status reports on systems' response to notification requirements. The

violation summary report from Mississippi (Figure A-10) is used to select appropriate formats for letters of notification.

IV. ROLE OF MSIS IN WATER SUPPLY MANAGEMENT

We have found that MSIS does maintain records of all federally mandated data, determine the compliance of a system with the regulations, and produce the required Federal reports. In this section, we explore the relations between the MSIS system and the data needs generated by the various functions of water supply management identified in Sections II and III. In Appendix B, we present a detailed analysis of particular MSIS program elements and reports relative to the needs identified in Section III.

A. Administration of State Water Supply Program

Although MSIS does not directly handle any budgetary functions for state water supply management, information available in the MSIS files is needed to determine priorities within the budget. This information includes time trends of water quality, numbers of community and noncommunity systems, and numbers of systems with difficulties as evidenced by poor compliance histories, etc. The problem of extracting this information from the files prompted the development and release, in December 1979, of the generalized Data Retrieval Subsystem. This software package is designed to produce summary or in-depth reports on arbitrary fields across file lines. An example of such a report is given in Figure A-12 in Appendix A.

The MSIS system is designed to produce automatically the required national EPA annual reports. Unfortunately, MSIS does not always provide the capability to meet all the reporting requirements of regional EPA offices. It appears that EPA regional reporting requirements are not uniform across the country and change with time within a given Region. In some Regions, administrative information not kept on MSIS files; for example, numbers of

sanitary surveys, field visits, or permits issued, must be included in reports to the Region. In addition, not all Regions are capable of processing the computer report tapes produced by MSIS and therefore require the states to submit printed copies of all data.

The MSIS files contain information needed by the state administration in directing the state program. Of particular use are status reports on compliance, response to enforcement actions, etc., and summaries of the state's public drinking water systems broken by geographical regions, type of water, or population. Reports such as these may be designed by the state water supply management using the Data Retrieval Subsystem or some similar instrument.

Requirements for exhaustive data on a particular system can be answered partially by reports generated by the MSIS system listing all information in the Public Water File on a particular system. However, these listings do not include any information on compliance history or response to enforcement actions, etc. It is to be hoped that judicious use of the report generator will be useful in filling such gaps in the information flow through water supply management.

B. Support and Surveillance of Public Water Supply System

The inventory compliance history and other data required by field staff are available on the MSIS files, although no reports specially designed for field personnel are produced by MSIS. The new Data Retrieval Subsytem is designed to produce summary reports on user specified fields across file lines. For example, a user could request a list of:

PWF-ID

PWF-PLANT-POPULATION-SERVED

PWF-PLANT-AREA-COUNTY-CODE

VIF-CONTAMINANT-ID

VIF-VIOLATION-ID

EAF-VIOLATION-TYPE

EAF-VIOLATION-DATE

for selected county codes. This report would access the PWF, VIF, and EAF files.

One of the most pressing data needs of field personnel is early notification of MCL and sampling violations. However, since MSIS was designed as a batch system, sample data are processed for violations only once a month. Both the system software and the data entry process would require modification to produce such notification.

In order to enter the necessary sample data into the system, interactive terminals or some equivalent system would need to be located in the laboratories. Special software would need to be designed to capture such data daily and produce the required listings, independently of the monthly compliance processing. These listings would then need to be made available (perhaps through onsite printing) to those responsible for notifying the public water supplies of sample results. The state-designed system in use in Wisconsin does provide such daily reports (see Figure A-12 in Appendix A.

Modification of the compliance process to provide this notification would be a major undertaking, but if it proved feasible, would provide a very valuable tool to the state water departments.

Data on plan approvals and on detailed operating procedures and treatment are not kept on the MSIS files. Field personnel and others who use such information keep their own files. It is not generally felt that there is need

to include such information in the MSIS system. However, some EPA Regions require inclusion of such information in quarterly reports.

C. Compliance Determination, Enforcement Actions, and Recordkeeping

The MSIS system does maintain records of all federally mandated data. However, detailed operating data and approval records must be kept on alternate files. Similarly, data on source quality are not entered into the MSIS system and are generally obtained when needed from the state environmental authorities.

The required national EPA reports are produced automatically by the MSIS system. Unfortunately, as noted above, the system does not produce reports that meet the requirements of the various regional EPA offices. With the use of the recently released Data Retrieval Subsystem or similar software, specially designed reports can be produced on arbitrary data fields across file lines, enabling the data management personnel to maintain the information flow within the department and produce special reports as required.

The compliance module, WAQC, is currently proving operational in the hands of users in several states. The successful use of the module appears to require the presence of both a water program representative and a data processing analyst experienced in the use of MSIS and dedicated to ensuring the smooth running of the system. Continual updating of the system software, with the introduction of yet new "bugs" does not contribute to user confidence in the module. In many states, a good deal of time is still spent in manual preediting the data and/or correcting keypunch errors. This problem increases in magnitude with the size of the water program. The use of alternative data entry procedures, such as interactive terminals or key-to-disk entry (both of which use formatted CRT screens with editing

capabilities), might be worthy of consideration. An example of such a formatted screen is seen in Figure A-14 in Appendix A. As users gain confidence in the system and are able to tailor the output reports to their particular needs, WAQC is proving a valuable tool in the state water program. (Examples of such specially tailored reports are given in Figures A-5 through A-10 in Appendix A).

The need for timely determination of violations is again felt in the enforcement office. The MSIS system was not designed to give first notification of MCL violations, and this process, perhaps the most data-intensive requirement of the Safe Drinking Water Act, must still be done manually. Automation of this task would require speedier data entry capabilities such as interactive terminals or key-to-disk capability. Although a major effort would be required to modify the MSIS system, automating the first notification of violations would be extremely helpful to the enforcement officers and to water supply management as a whole.

The MSIS system provides no mechanism for the production of letters of notification of violations to water systems, although some states have developed their own software to help meet this need. For example, the violation summary report produced in Mississippi (Figure A-10) is used to select appropriate formats for such letters of notification.

Reports that track the system's response to enforcement actions have been developed by some states from data in the MSIS files. (Examples are included in Appendix A). The Data Retrieval Subsystem software might well be used to design such reports where they are needed.

A summary of data flow through our functional model of water supply management and our recommendations for improvements to this data flow are given in Section V.

V. SUMMARY AND RECOMMENDATIONS

A. Summary

As a basis for the evaluation of the role of MSIS in state water supply management needs, RTI has developed a generic functional description of water supply management (see Figure II-1 of Section II). For each major function within state water supply management--administration, support and surveillance of public water systems, compliance determination, recordkeeping, and enforcement actions--RTI has described the data flow and the data needs in Section III of this report.

Figure V-1 describes the data flow through state water supply management as a whole, and Figure V-2 summarizes the data needs identified in each function.

The role of MSIS relative to the data needs of water supply management is discussed in Section IV of this report. In summary, we have found that, in general, all the information required for management of state water supply programs is contained in the MSIS files, that MSIS does produce the required Federal reports, and that the MSIS compliance procedure (WAQC) is operational in the hands of experienced users. However, we feel there are data needs of water supply management that are not met by MSIS and that improvement could be made in the personnel resource efficiency of some MSIS procedures. On the other hand, it is necessary for the states to commit sufficient resources (particularly personnel) to ensure the successful operation of MSIS.

B. Recommendations for MSIS

It is felt, on the whole, that the MSIS files do contain most of the information needed by state water supply management. However, many states

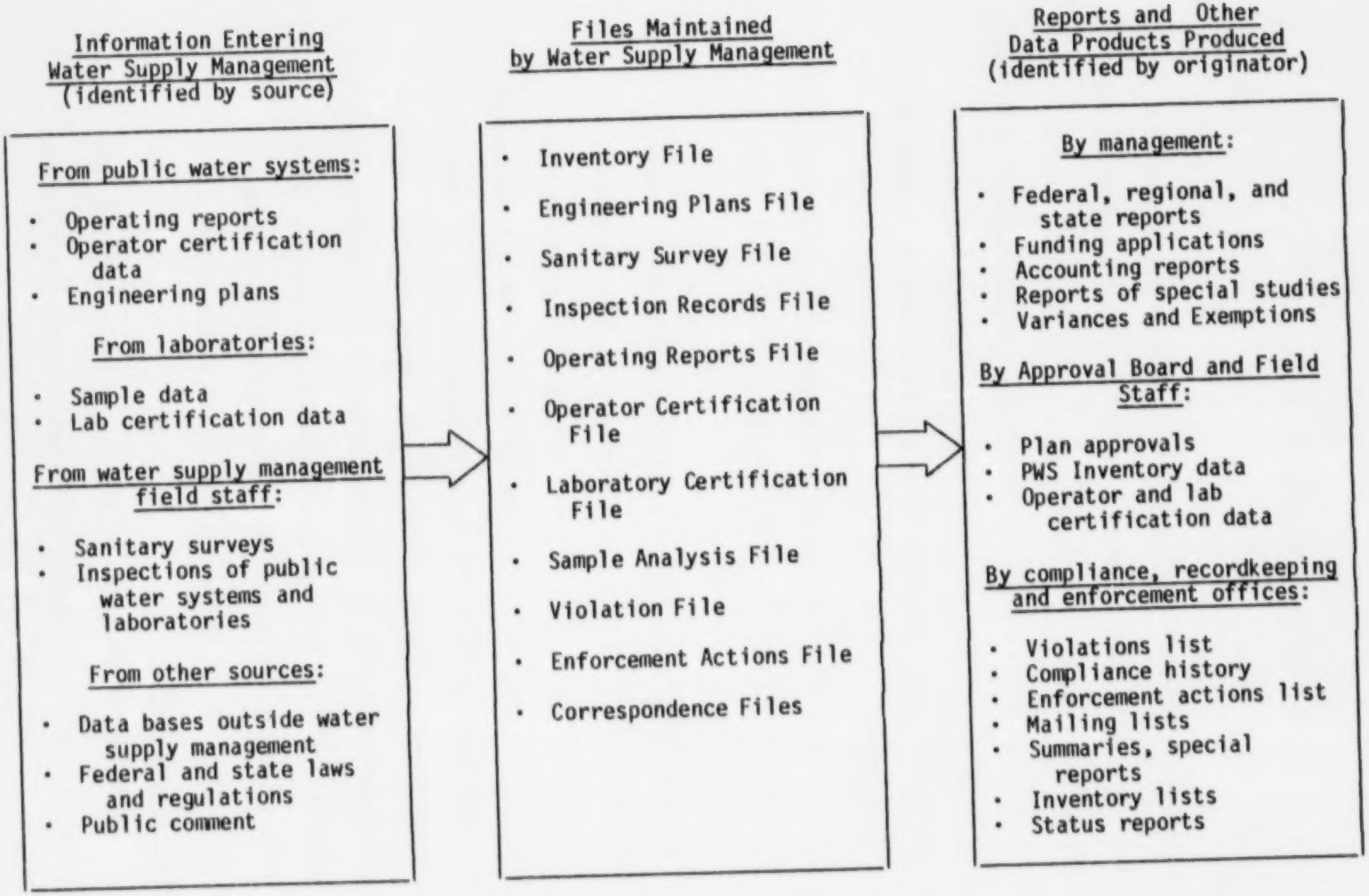
Information Entering Water Supply Management (identified by source)
From public water systems:
• Operating reports
• Operator certification data
• Engineering plans
From laboratories:
• Sample data
• Lab certification data
From water supply management field staff:
• Sanitary surveys
• Inspections of public water systems and laboratories
From other sources:
• Data bases outside water supply management
• Federal and state laws and regulations
• Public comment
Files Maintained by Water Supply Management
• Inventory File
• Engineering Plans File
• Sanitary Survey File
• Inspection Records File
• Operating Reports File
• Operator Certification File
• Laboratory Certification File
• Sample Analysis File
• Violation File
• Enforcement Actions File
• Correspondence Files
Reports and Other Data Products Produced (identified by originator)
By management:
• Federal, regional, and state reports
• Funding applications
• Accounting reports
• Reports of special studies
• Variances and Exemptions
By Approval Board and Field Staff:
• Plan approvals
• PWS Inventory data
• Operator and lab certification data
By compliance, recordkeeping and enforcement offices:
• Violations list
• Compliance history
• Enforcement actions list
• Mailing lists
• Summaries, special reports
• Inventory lists
• Status reports

Figure V-1. Information Flow Through State Water Supply Management

DATA NEEDS FOR ADMINISTRATION OF WATER SUPPLY MANAGEMENT

- Immediate access to exhaustive data on particular system in response to public complaint or in time of emergency or general review.
- The capability of producing summary data on arbitrary fields of interest across file lines.
- The capability of producing required national and regional EPA reports.
- The capability of producing ad hoc reports in response to public inquiry or special need.
- Status reports on activities of various department (e.g., the status of all Public Water Systems on the required chemical sampling; the status of required public notifications of violations).
- Time trends of various data: contaminant levels, compliance history, etc.
- Mailing lists.
- Correlation of data in the water supply data system with files in other agencies.

DATA NEEDS FOR SUPPORT AND SURVEILLANCE OF WATER SUPPLY MANAGEMENT

- Source quantity and quality, time trends and summaries.
- Detailed inventory data including operational data and treatment processes.
- Accurate mailing lists for operators, owners, and public water systems.
- Operator certification data.
- Records of approval.
- Compliance histories.
- Records of previous inspections.
- Data on lab certification and sampling responsiblity.
- Timely record of sampling violations.

(Continued)

Figure V-2. Summary of Data Needs

DATA NEEDS FOR COMPLIANCE DETERMINATION, RECORDKEEPING, AND ENFORCEMENT ACTION

- Well-designed input and output documents and well-documented and efficient procedures.
- Efficient request and scheduling procedures.
- Well-designed file structures and maintenance procedures.
- Report generator to satisfy the variety of inquiries into water system data.
- Good data-editing capabilities and effective procedures to correct invalid data in all files.
- Efficient and effective procedures for determining violations.
- Timely data on MCL, sampling, and other violations.
- Status reports on systems submitting samples, systems in violation, and systems' response to enforcement actions.
- Efficient procedures for notifying water systems, management, and field personnel of violations.
- Good tracking procedures for previous enforcement actions and the response of water systems.
- Access to inventory, variance and exemption, and previous compliance records.
- Accurate mailing list, including telephone numbers.

Figure V-2. Summary of Data Needs (Continued)

would like additional space on the files available for optional information. Although MSIS does produce the required Federal reports, it is not able to produce reports meeting the requirements of all EPA regional offices. These requirements are not uniform across the country, and may vary from time to time within a Region. In some Regions, data are required that are not kept on the MSIS system, and some Regions are not able to process data from the MSIS-generated computer tapes. Unless these regional reporting requirements can be simplified, it does not appear that MSIS will be able to address regional reporting requirements.

Most initial problems encountered with the system software have been resolved, but new "bugs" continue to appear in the ensuing updates. Fewer updates to the code with more thoroughly pretested procedures would eliminate much wasted time and effort for the users and provide them with greater confidence in the system.

At one time it was felt that the response of EPA/ODW and the University of Cincinnati Computing Center to users' suggestions for system improvements was not one of encouragement. However, improvement is seen here with the formation of the various technical advisory committees by the MSIS User Support Group. The degree of success met by these committees in solving the problems put to them will depend on the amount of time and effort the members are able to contribute to their task.

Complaints that the MSIS-generated reports do not meet the variety of management information needs were answered by the development of the Data Retrieval Subsystem and released to the users in December 1979. It is to be hoped that this software will prove to have the flexibility and power to produce the many varied summary and in-depth detail reports (as identified in Section III) needed by the states to manage their water supplies properly.

An evaluation of the utilization of the Data Retrieval Subsystem should definitely be scheduled after an appropriate time and further action taken at that time to correct any deficiencies perceived.

One of the most pressing data needs of water management (and one not addressed by MSIS) is the prompt notification of water systems and the state agency of MCL and monitoring violations. Since MSIS is a batch system, with compliance determination run monthly, first notification was not intended to be an MSIS function, and an extensive effort would be needed to include the notification process in MSIS. In addition, this type of processing would require more rapid data entry procedures than conventional batch keypunching, such as provided by interactive terminals. However, if it were feasible, we feel that development of the appropriate software would be of great benefit to state water supply management.

The MSIS system is complex and was installed in state water supply departments whose previous exposure to computer systems ranged from highly sophisticated to minimal. Some difficulty in getting the system operational was to be anticipated. However, the degree of difficulty encountered in initial attempts to use the system, particularly the WAQC module, suggests that perhaps the system design is unnecessarily complex and needs simplification, at least from an operational standpoint. The use of interactive terminals or key-to-disk data entry would facilitate the preediting of the data and might contribute to more effective use of the system.

Due to the complexity of the system, turnover in data processing personnel can cause serious interruptions in information flow if effective training procedures for new personnel are not employed. Ideally, new

personnel could be trained by their outgoing counterparts. Since this does not seem to be the general practice in state government offices, there is need for a customized training program to bring new personnel up to speed on the system. This could be developed by individual states, or by EPA and offered at cost to the states.

Some states and EPA Regions are now successfully running compliance with the WAQC module and gaining confidence in its ability to determine compliance correctly. Parallel efforts are continuing to be made by the University of Cincinnati Computing Center and EPA/ODW to resolve interpretive issues and to improve the operational utility and efficiency of tne software. However, even with the MSIS software in place and functioning, compliance determination is a complex process that is not very well described in the MSIS documentation. We believe the entire body of MSIS documentation needs review and reorganization, or at least a thorough indexing.

C. Recommendations for State Water Supply Management

Neither MSIS nor any other computer system can solve all problems of state water supply management. It remains the user's responsibility to integrate MSIS into the overall water program, adapting input and output formats and procedures to the special requirements of the individual state. Good data management procedures must be employed if any system is to be successful. In particular, each state has the following responsibilities:

- Support data management activities with sufficient personnel resources.
- Make a positive effort to identify all public water systems and inspect them regularly.
- Design and schedule audits to ensure valid sampling and analysis results.

- Establish good data control measures to ensure smooth data flow through the system.
- Ensure cooperation of field and local personnel by sharing the information benefits of the system and by involving them in the design of the input process.
- Take an active role in designing and implementing improvements to the data management system in use (MSIS or another).

It is necessary to support the MSIS effort with sufficient personnel resources. In those states in which MSIS has proved most effective, there is usually one computer analyst and one water program specialist, both thoroughly familiar with the system, whose responsibility it is to ensure the smooth operation of the system. When turnover occurs in either of these positions, new personnel need to be thoroughly trained before assuming full responsibility or a serious interruption in operations is almost inevitable. In addition to these key personnel, clerical support for control of the data in and out of the compliance process is essential. This problem of maintaining an experienced staff, or training new staff, needs to be addressed by the states, perhaps in concert with EPA.

We would again like to thank those states who participated in this study for their understanding and cooperation.

APPENDIX A

REPORT FORMATS DEVELOPED BY STATES VISITED

[illegible]	[illegible]	[illegible]	TAYLORSVILLE		NC 28681
01-02-015	ALEXANDER	02165	01-12-102	ALEXANDER	02662
ALEXANDER CO WATER CORP		COE	FAIRFIELD ACRES		
RR 4 LAKE HICKORY SUBT			M E HEATH PRES		
P O BOX 368			BETHLEHEM UTILITIES INC AT 5		
STONEY POINT		NC 28678	HICKORY		NC 28601
01-12-103	ALEXANDER	02137	01-12-104	ALEXANDER	03028
HEGRA HEIGHTS			HERITAGE PARKS DEV		
P E ECK			B J CORNWICK JR		
PLOTTE & ECK [illegible]			P O BOX 6		
STONEY POINT		NC 28678	STONEY POINT		NC 28678
01-12-105	ALEXANDER	C 02568	01-12-106	ALEXANDER	02575
HICKORY HOME PARK			HILLCREST SUBDIVISION		
P O BOX 2365			B J CORNWICK		
HICKORY		NC 28603	P O BOX 6		
			STONEY POINT		NC 28678
01-12-107	ALEXANDER	C 02432	01-12-108	ALEXANDER	C 02403
LAKEWOOD PARK BEACH ET INC			LAKEWOOD MUTUAL HA ASSOC		
M E HEATH PRES			MR MURRAY STARNES		
ROUTE 1			ROUTE 11 BOX 520		
HICKORY		NC 28601	HICKORY		NC 28601
01-12-109	ALEXANDER	02224	01-12-110	ALEXANDER	00732
PELSTEAD CORP LA SYS			JERRY STARNES M H P		
RES AGT R FULSTEAD			MR JERRY STARNES		
635 1 MAIN ST			RT 11 BOX 520		
TAYLORSVILLE		NC 28681	HICKORY		NC 28601

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Figure A-1. Mailing Labels
State of North Carolina

DATE 11/27/79 PAGE 0001

ID	NAME	ADDRESS	CITY	ZIP	COUNTY	PHONE NO.	SOURCE	DISTRICT	POPULATION
0010002	COLUMBIA UTILITIES COMMISSION	MUNICIPAL BLDG (CAMPBELLSVILLE	COLUMBIA	42728	ADAIR	502-384-2006	S=19	03	0000002000
0010702	ADAIR CO WATER DISTRICT	MUNICIPAL BLDG (CAMPBELLSVILLE	COLUMBIA	42728	ADAIR	502-384-2006	M	03	0000000328
0010117	SPARKSVILLE ELEMENTARY SCHOOL		SPARKSVILLE	42728	ADAIR	- -	G=10	03	0000000278
0010118	SHEPHERD ELEMENTARY SCHOOL		COLUMBIA	42728	ADAIR	- -	G=10	03	0000000210
0010136	HOLMES BOAT DOCK	RT 1	COLUMBIA	42728	ADAIR	- -	G=10	03	0000001100
0010204	DIV REAL PROPERTY/ADAIR REST	698 WILKERSON BLVD	FRANKFORT	40601	ADAIR	502-364-3040	G=10	03	0000000300
0010203	KNIPLEY ELEM SCHOOL		KNIPLEY	42753	ADAIR	- -	G=10	03	0000000200
0010676	CANE VALLEY ELEM SCHOOL		CANE VALLEY	42720	ADAIR	- -	G=10	03	0000000100
0010698	CORPS OF ENGRS/HOLMES DEMO OP	RT 3	CAMPBELLSVILLE	42718	ADAIR	502-465-4463	S=19	03	0000000391
0020306	SCOTTSVILLE WATER DEPT	CITY COUNTY BLDG	SCOTTSVILLE	42164	ALLEN	502-237-4402	S=19	03	0000005300
0020926	ALLEN CO WATER DISTRICT	RT 4	SCOTTSVILLE	42164	ALLEN	502-622-6999	P	03	0000000140
0030007	ALTON WATER DISTRICT	RR 4	LAWRENCEBURG	40342	ANDERSON	502-839-3390	P	04	0000000000
0030239	LAWRENCEBURG WATER/SEWER DEPT	201 BUILDING COURT ST	LAWRENCEBURG	40342	ANDERSON	502-839-3378	S=19	04	0000020000
0030-21	STRINGTOWN WATER DISTRICT	RT 2 (% E HUNT)	LAWRENCEBURG	40342	ANDERSON	502-839-7437	P	04	0000000000
0030010	SD ANDERSON WATER DIST	P O BOX 33	LAWRENCEBURG	40342	ANDERSON	502-839-4736	P	04	0000000630
0030004	WESTERN HIGH SCHOOL	ROUTE 3	LAWRENCEBURG	40342	ANDERSON	502-839-3408	S=19	04	0000000400
0040013	BANDANA WATER DISTRICT	PO BOX 117	BANDANA	42022	BALLARD	502-224-2161	G=10	01	0000000300
0040020	BARLOW WATER/SEWERAGE WORKS	P O BOX 146	BARLOW	42024	BALLARD	502-334-3500	G=10	01	0000000700
0040233	KEVIL WATER DEPT		KEVIL	42053	BALLARD	502-462-3183	S=19	01	0000000130
00-0238	LACENTER MUNICIPAL WATER CO	P O BOX 371	LACENTER	42056	BALLARD	502-665-5162	G=10	01	0000001031
2040259	LOVELACEVILLE WATER CO	P O BOX 65	LOVELACEVILLE	42060	BALLARD	502-488-3224	G=10	01	0000000200
0040460	WICKLIFFE MUNICIPAL WATER SYS	P O BOX 493	WICKLIFFE	42087	BALLARD	502-335-3557	G=10	01	0000001200
0040000	BALLARD MEMORIAL HIGH SCHOOL	HWY 6 WEST	LACENTER	40446	BALLARD	- -	G=10	01	0000000037
0040001	FIN AND FEATHER FUN	RT 1	LACENTER	42056	BALLARD	- -	G=10	01	0000000030
0040002	DAMONS RESTAURANT		LA CENTER	42056	BALLARD	- -	G=10	01	0000000025
0040730	BALLARD WILDLIFE AREA	RT 1	LA CENTER	42056	BALLARD	- -	G=10	01	0000000100
0030100	GLASGOW WATER CO PLANT 01	RT 8 BOX 106 % HERB L PURSLEY	GLASGOW	42141	BARREN	502-651-3727	S=19	03	0000020000
0030317	N BARREN WATER ASSOC INC	P O BOX 426	GLASGOW	42141	BARREN	502-651-3727	P	03	0000000300
0030344	PARK CITY WATER WORKS		PARK CITY	42160	BARREN	502-749-2721	P	03	0000000300
0030404	GLASGOW WATER CO PLANT 02	RT 8 BOX 106 % HERB L PURSLEY	GLASGOW	42141	BARREN	502-651-3727	S=19	03	0000020000
0030338	DIAMOND CAVERNS KOA CAMPGROUND	HWY 255 (LARRY DOYLE)	PARK CITY	42160	BARREN	- -	G=10	03	0000000379
0060002	BATH COUNTY WATER DISTRICT	BANK BLDG	SALT LICK	40371	BATH	606-663-2091	P	05	0000003200
0060338	OWINGSVILLE CITY WATER DEPT	P O BOX 323	OWINGSVILLE	40360	BATH	606-674-6361	S=19	05	0000002300
0060392	SHARPSBURG WATER DISTRICT	P O BOX 286	SHARPSBURG	40374	BATH	606-247-2141	S=19	05	0000001300
0062391	US FOREST SERVICE/CLEAR CRK 01	P O BOX 10	MOREHEAD	40351	BATH	606-784-3624	G=10	05	0000000025
0062747	US FOREST SERVICE/CLEAR CRK 02	P O BOX 10	MOREHEAD	40351	BATH	606-784-3624	G=10	05	0000000025
0062748	US FOREST SERVICE/CLEAR CRK 04	P O BOX 10	MOREHEAD	40351	BATH	606-784-3624	G=10	05	0000000025
0070091	GREENBRIAR SQUARE TRAILER PARK	RT 2 BOX 704	MIDDLESBORO	40965	BELL	- -	G=10	6A	0000000025
0070142	KENTUCKY UTILITIES CO	PARK ST	FOUR MILE	40939	BELL	606- -	G=10	6A	0000000300
0070202	KENTUCKY WATER SERVICE CO INC	P O BOX 810	MIDDLESBORO	40965	BELL	606-848-3738	S=19	6A	0000018900
0070353	PINEVILLE WATER SYSTEM	P O BOX 386	PINEVILLE	40977	BELL	606-337-6611	S=19	6A	0000000000
0070729	BELL COUNTY FORESTRY CAMP	BUREAU OF CORRECTIONS	CHEWOA	40965	BELL	606-337-2844	G=10	6A	0000000040

Figure A-2. Inventory Summary ("1-line") Report
State of Kentucky

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PUBLIC WATER SYSTEM INVENTORY

PC	STA ID	TYPE	PUBLIC WATER SYSTEM	LOCATION	SC	CO	POPULATION	SOURCE		FED ID NO
100	0000[illegible]	03	ADDISON VILLAGE	ADDISON	A	50	0000002200	G		0001203
100	0000[illegible]	03	AFTON VILLAGE	AFTON	A	09	0000001200	G		0001758
100	0000[illegible]	03	AKRON VILLAGE	AKRON	A	13	0000003400			0000347
100	0000[illegible]	01	ALBANY CITY	ALBANY	A	01	0001158000	S		0000189
100	0000[illegible]	0A	ALBERTSON WATER DISTRICT	ROSLYN HEIGHTS	A	29	0000013000	G		0002815
100	0000[illegible]	03	ALBION VILLAGE	ALBION	A	36	0000005100	S		0000546
100	0000[illegible]	03	ALDEN VILLAGE	ALDEN	A	14	0000004500	G		0000348
100	0000[illegible]	03	ALEXANDER VILLAGE	ALEXANDER	A	18	0000000480		P	0000502
100	0000[illegible]	03	ALEXANDRIA BAY VILLAGE	ALEXANDRIA BAY	A	22	0000001900		P	0002329
100	0000[illegible]	03	ALFRED VILLAGE	ALFRED	A	02	0000000000	G		0000309
100	0000[illegible]	03	ALLEGANY VILLAGE	ALLEGANY	A	09	0000002200			0000330
100	0000[illegible]	0A	ALLEGANY CO OD 2	ALLEGANY	A	09	0000002000	G		0000332
100	0000[illegible]	03	ALMOND VILLAGE	ALMOND	A	02	0000000750	G		0000310
100	0000[illegible]	03	ALTAMONT VILLAGE	ALTAMONT	A	01	0000002200	S		0000140
100	0001[illegible]	07	AMAGANSETT WATER CO	AMAGANSETT	I	51	0000004263			0003691
100	0001[illegible]	0B	AMENIA OD #1	AMENIA	A	13	0000000999	G		0002759
100	0001[illegible]	0A	AMHERST OD #1	WILLIAMSVILLE	A	14	0000008000		P	0000349
100	0001[illegible]	0A	AMHERST OD #2	WILLIAMSVILLE	A	14	0000005000		P	0000000
100	0002[illegible]	01	AMSTERDAM CITY	BROADALBIN (T)	A	28	0000026500	S		0000136
100	0002[illegible]	0A	HARDACRE WATER DISTRICT	AMSTERDAM	A	28	0000001500		P	0011730
100	0002[illegible]	03	ANDES VILLAGE	ANDES	A	12	0000000000	G		0000298
100	0002[illegible]	03	ANDOVER VILLAGE	ANDOVER	A	02	0000001200	G		0000311
100	0002[illegible]	03	ANGELICA VILLAGE	ANGELICA	A	02	0000000750	G		0000312
100	0002[illegible]	03	ANGOLA VILLAGE	ANGOLA	A	14	0000008000			0000411
100	0002[illegible]	03	ANTWERP VILLAGE	ANTWERP	A	22	0000000950	G		0002330
100	0003[illegible]	03	ARCADE VILLAGE	ARCADE	A	60	0000001712			0000608
100	0003[illegible]	0A	YORKSHIRE TOSO WATER DISTRICT	DELEVAN	A	04				0012216
100	0003[illegible]	07	ARDEN FARMS DAIRY CO	ARDEN	A	35	0000000050			0003562
100	0003[illegible]	03	ARGYLE VILLAGE	ARGYLE	A	57	0000002400			0000116
100	0003[illegible]	03	ARKPORT VILLAGE	ARKPORT	A	50	0000001000	S G		0001204
100	0003[illegible]	0A	ARKVILLE OD	ARKVILLE	A	12	0000000000	S		0000249
100	0003[illegible]	03	ATHENS VILLAGE	ATHENS	A	19	0000001700			0000024
100	0004[illegible]	03	ATTICA VILLAGE	ATTICA	A	50	0000003800	S		0000607
100	0004[illegible]	01	AUBURN CITY	AUBURN	A	05	0000036000	S		0001710
100	0004[illegible]	0A	AURELIUS OD #01	CAYUGA	A	05	0000001000		P	0001711
100	0004[illegible]	0A	AURELIUS OD #02	CAYUGA	A	05			P	0011731
100	0004[illegible]	0A	AURELIUS OD #03	CAYUGA	A	05	0000000300		P	0011732
100	0004[illegible]	03	AURORA VILLAGE	AURORA	A	05	0000000400		P	0001714
100	0004[illegible]	05	AURORA OD #1	EAST AURORA	A	14	0000000275		P	0000412
100	0004[illegible]	03	AVOCA VILLAGE	AVOCA	A	50	0000001250	G		0001205

Figure A-3. Inventory Summary ("1-line") Report
State of New York

SELECTED PUBLIC WATER SYSTEM INVENTORY

```
COUNTY (07) CHEMUNG
REGION  = WESTERN (ROCHESTER)
PROGRAM CODE= 100
COMMUNITY

PROG CODE = 100  STATION NUMBER = 00211000 TYPE = 08 COUNTY = 07
SUPPLY NAME = BEAVER VALLEY WATER DISTRICT     STATUS CODE =  A
SUPPLY STREET=CAITLIN DRIVE
SUPPLY CITY = CAITLIN (T)                      DATE OF STATUS = 03/31/78
STATE = NY  ZIP CODE = 14812  TELEPHONE NUMBER = 6079621748
OWNER NAME  =
OWNER TITLE = SUPERVISOR AND TOWN BOARD
OWNER AGENCY=
OWNER STREET= 4865 SANDY RD
OWNER CITY  = HORSEHEADS
STATE = NY  ZIP CODE = 14845  TELEPHONE NUMBER  = 6077394491
OPERATOR NAME = CHURCH        GENE             OPERATOR NUMBER = 04978

PROG CODE = 100  STATION NUMBER = 01938000 TYPE = 08 COUNTY = 07
SUPPLY NAME = BIG FLATS WATER DISTRICT #1      STATUS CODE =  A
SUPPLY STREET=COUNTY ROUTE 60
SUPPLY CITY = BIG FLATS                        DATE OF STATUS = 03/31/78
STATE = NY  ZIP CODE = 14814  TELEPHONE NUMBER = 6075628443
OWNER NAME  =
OWNER TITLE = SUPERVISOR TOWN OF BIG FLATS
OWNER AGENCY=
OWNER STREET= BIG FLATS TOWN HALL MAPLE ST
OWNER CITY  = BIG FLATS
STATE = NY  ZIP CODE = 14814  TELEPHONE NUMBER  = 6075628443
OPERATOR NAME = WOOLEFER      GERALD           OPERATOR NUMBER = 00000

PROG CODE = 100  STATION NUMBER = 02257000 TYPE = 08 COUNTY = 07
SUPPLY NAME = BIG FLATS WATER DISTRICT #2      STATUS CODE =  A
SUPPLY STREET=CARPENTER RD
SUPPLY CITY = BIG FLATS                        DATE OF STATUS = 03/31/78
STATE = NY  ZIP CODE = 14814  TELEPHONE NUMBER = 6075628443
OWNER NAME  =
OWNER TITLE = SUPERVISOR TOWN OF BIG FLATS
OWNER AGENCY=
OWNER STREET= BIG FLATS TOWN HALL MAPLE ST
OWNER CITY  = BIG FLATS
STATE = NY  ZIP CODE = 14814  TELEPHONE NUMBER  = 6075628443
```

Figure A-4. Inventory Summary ("12-line") Report
State of New York

12/04/79 P W S VIOLATIONS REPORT FOR THE COMPLIANCE PERIOD OCTOBER 1978 - JUNE 1979 PAGE 1

PWS ID	MAILING NAME	YEAR	COMPLIANCE MONTH	CONTAM ID	VIOLATION TYPE	VIF POPULATION	SAMPLES REQUIRED	SAMPLES TAKEN	ANALYSIS RESULT	ANALYSIS DECIMALS	VIOLATION ID

Figure A-5. Violations Report Format
State of Kentucky

SUMMARY OF VIOLATION ACTIVITY BY COUNTY

COUNTY	NEW NEAR BACT	NEW NEAR TURB	NEW NEAR 2TUR	NEW NEAR OTH	NEAR COMP	NEW MCL BACT	NEW MCL TURB	NEW MCL 2TUR	MCL OTH	NEW MCL COMP	M/TV OUT	NEWS OUT	CUST OUT	NEW V/E	V/E COMP	NO RPT	[illegible]
ALBANY																	
ALLEGANY																	
BROOME																	
CATTARAUGUS																	
CAYUGA																	
CHAUTAUQUA																	
CHEMUNG																	
CHENANGO																	
CLINTON																	
COLUMBIA																	
CORTLAND																	
DELAWARE																	
DUTCHESS																	
ERIE																	
ESSEX																	
FRANKLIN																	
FULTON																	
GENESEE																	
GREENE																	
HAMILTON																	
HERKIMER																	

Figure A-6. Violation Summary List by County
State of New York

DATE 10/11/79 — NEW YORK STATE DEPARTMENT OF HEALTH — PAGE 2

PUBLIC WATER SYSTEM
MONTHLY VIOLATION AND NOTIFICATION SUMMARY
REPORT PERIOD 1979 AUGUST

COUNTY (02) ALLEGANY
REGION BUFFALO

PWS CODE	NAME OF SYSTEM	TYPE	STATION NUMBER	VIOLATION NUMBER	PER TYPE	REC PRIN	VIOL CODE	CONTAM NAME	NON COMPLIANCE M&R	NON COMPLIANCE MCL	NOTIFICATION RADIO REQ/ REC/ PERF	NOTIFICATION NEWSPA REQ/ REC/ PERF	NOTIFICATION CUSTOM REQ/ REC/ PERF
100	RICHBURG VILLAGE												
100	RICHBURG VILLAGE												
100	RICHBURG VILLAGE												
100	RUSHFORD SPRING WATER CO												
100	WHITESVILLE WATER SUPPLY												
100	WHITESVILLE WATER SUPPLY												
* 100	WHITESVILLE WATER SUPPLY												

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Figure A-7. Violation Summary Report Format Including Notification Required and Made State of New York

TURBIDITY MONITORING SUMMARY

PWSC DATE: 74Q4

REGION	ACTIVE SURFACE SYSTEMS	ACTIVE SURFACE SOURCES	NO. OF SYSTEMS IN VIOLATION		TOTAL POPULATION SERVED BY VIOLATORS	PUBLIC NOTIFICATIONS		NO. OF CURRENT VIOLATORS WITH PREVIOUS FY VIOLATIONS
			REPORTING	ROUTINE		REQUIRED	MADE	
1	24	36						
2	65	93						
3	47	93						
4	116	205						
5	82	113						
6	55	76						
7	55	89						
TOTAL	444	705						

Figure A-8. Monitoring Summary Format Including Notification Required and Made EPA Region IV, Pennsylvania Section

A58206 STATE OF WISCONSIN PAGE 9
DISTRICT - SOUTHERN DEPARTMENT OF NATURAL RESOURCES
COUNTY - DANE SUMMARY OF PUBLIC WATER SUPPLY BACTI SAMPLES FOR 09/01/78 THRU 09/30/78 10/30/78
SYSTEM TYPE - C-MUN

113007890
STOUGHTON WATERWORKS
STOUGHTON
GARY A GRAHAM
(608) 873-3379 LAB ID = 999
REQUIRED SAMPLES = 2/MO

SUMMARY

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
DISTRIBUTION SAMPLES - SAFE=									9				9
- UNSAFE=									3				3
TOTAL=									12				12

UNSAFE SAMPLE INFORMATION

TYPE	DATE	LOCATION	RESULT
D	9/ 6	FAUCET WATER TOWER 11 FURSETH RD	MFCC=001
D	9/13	INSIDE FAUCET WELL 09 N VAN BUREN ST	MFCC=006
D	9/18	TOWER 2 FURSETH RD.	TUBE=2/5

CHECK SAMPLE INFORMATION

TYPE	DATE	LOCATION	RESULT
C	9/15	INSIDE FAUCET WELL 09 N VAN BUREN ST	MFCC=000
C	9/27	WATER TOWER 2 FURSETH RD.	MFCC=000

113025800
SUN PRAIRIE WATERWORKS
SUN PRAIRIE
GEORGE STRAUS
(608) 837-5500 LAB ID = 999
REQUIRED SAMPLES = 12/MO

SUMMARY

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
DISTRIBUTION SAMPLES - SAFE=									12				12
- UNSAFE=									0				0
TOTAL=									12				12

113026100
DANE COUNTY HOME & HOSPITAL
VERONA
PAT GANDER
(608) 845-6601 LAB ID = 999
REQUIRED SAMPLES = 2/MO

SUMMARY

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
DISTRIBUTION SAMPLES - SAFE=									2				2
- UNSAFE=									0				0
TOTAL=									2				2

113025990
VERONA WATERWORKS
VERONA
DONALD CROWNHART
(608) 845-6695 LAB ID = 999
REQUIRED SAMPLES = 2/MO

SUMMARY

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
DISTRIBUTION SAMPLES - SAFE=									2				2
- UNSAFE=									0				0
TOTAL=									2				2

Figure A-9. Monthly Bacti Summary, State of Wisconsin

BUREAU OF ENVIRONMENTAL HEALTH
DIVISION OF WATER SUPPLY, J L MAY- COMPLIANCE OFFICER
SUMMARY OF NON-COMPLIANCE LETTERS TO BE SENT

PWS-ID	WATER SUPPLY NAME AND ADDRESS	GRADING PERIOD	YEAR	02 MCL AVG	MONITORING MTH	MONITORING RQD	MONITORING TKN	04 CHK SMP	VIOL ID
0150003	CRYSTAL SPRINGS WATER SERVICE MAYOR JOHN ROBERT LANG PO BOX 151 CRYSTAL SPRINGS MS 39059 COPIAH	MONTH June	1980	13.5					13063
0150005	TOWN OF GEORGETOWN ATTENTION MAYOR PO BOX 62 GEORGETOWN MS 39078 COPIAH	QUARTER APR - JUN	1980	17.5				***	13067 13066
0150009	COPIAH NEW ZION WATER ASSOC MR HOWARD HUGHES ROUTE 3 BOX 81 CRYSTAL SPRINGS MS 39059 COPIAH	QUARTER APR - JUN	1980	5.81					13105
0160004	NORTH COVINGTON WATER ASSN-NORTH MR JOHNNY O SMITH PO BX 902 COLLINS MS 39428 COVINGTON	QUARTER APR - JUN	1980	13.33					13119
0160007	SANFORD WATER ASSOCIATION MR WARREN WILSON ROUTE 1 BOX 231 SEMINARY MS 39479 COVINGTON	QUARTER APR - JUN	1980		APR MAY JUN	1 1 1	0 0 0		13120 13121 13122
0160008	SOUTHSIDE WATER ASSOCIATION MR DOLPHUS DONALD RT 2 BX 257 MT OLIVE MS 39119 COVINGTON	QUARTER APR - JUN	1980		APR	1	0		13125

Figure A-10. Summary of Systems in Violation
(keyed to noncompliance letters) State of Mississippi

MISSISSIPPI STATE BOARD OF HEALTH
DIVISION OF WATER SUPPLY - ATTN MR DAVID MITCHELL
WATER SUPPLIES NOT SURVEYED SINCE JULY 1, 1979

PWS-ID	NAME	LAST SURVEY DATE		REG	DIST
0020014	PRENTISS ALCORN WATER ASSOC	OCTOBER	1978	01	02
C070C01	CROSSROADS WATER ASSOC NO 2	NO SURVEY	****	01	04
C070002	BIG CREEK WATER ASSOCIATION	MAY	1978	01	04
C070C05	CROSSROADS WATER ASSN #1	MAY	1978	01	04
CC7CC06	DERMA WATER WORKS	MAY	1978	01	04
C070007	DUNCAN HILL WATER ASSOCIATION	FEBRUARY	1975	01	04
C070008	MACEDONIA WATER ASSOCIATION	MARCH	1976	01	04
C07CC09	MIDWAY WATER ASSOCIATION	MAY	1978	01	04
0070010	MT COMFORT WATER ASSOC NO 5	JANUARY	1977	01	04
0070011	MT COMFORT WATER ASSOC NO 4	JANUARY	1977	01	04
C07C012	NEW LIBERTY WATER ASSOCIATION	JANUARY	1977	01	04
0070014	MT COMFORT WATER ASSOC NO 2	JANUARY	1977	01	04
C070016	POPLAR SPRINGS WATER ASSOCIATI	JANUARY	1977	01	04
C07C017	MT COMFORT WATER ASSOC NO 1	JANUARY	1977	01	04
C070018	SLATE SPRINGS WATER ASSN	MAY	1978	01	04
007C019	VARDAMAN WATER DEPT	APRIL	1979	01	04

Figure A-11. Water Supplies Not Surveyed
(for use by field staff) State of Mississippi

SYSTEM NAME: RIPON WIS POWER & LIGHT
COUNTY: FOND DU LAC CITY: RIPON
LOCATION DESCRIPTION: DOUGLAS ST.
SAMPLE TYPE: NEW CONST.
ANALYSIS RESULT: 7 MFCC/100ML
DATE REPORTED: 10/25/78

FACILITY ID #: 420047630
DATE: 10/23/78
TIME: 15130
ANALYSIS METHOD: MEMB. FILT.
BACTI INTERPRETATION: UNSAFE
LAB SLIP #: 030859

SYSTEM NAME: KIELER SD NO 1
COUNTY: GRANT CITY: KIELER
LOCATION DESCRIPTION: FLANGE HOME
SAMPLE TYPE: REGULAR
ANALYSIS RESULT: 8 MFCC/100ML
DATE REPORTED: 10/25/78

FACILITY ID #: 122010350
DATE: 10/23/78
TIME: 14102
ANALYSIS METHOD: MEMB. FILT.
BACTI INTERPRETATION: UNSAFE
LAB SLIP #: 030851

SYSTEM NAME: MONROE WATERWORKS
COUNTY: GREEN CITY: MONROE
LOCATION DESCRIPTION: V.F.W.1428 17TH.S
SAMPLE TYPE: CHECK PREVIOUS UNSAFE: 10/17/78
ANALYSIS RESULT: 7 MFCC/100ML
DATE REPORTED: 10/25/78

FACILITY ID #: 123007830
DATE: 10/23/78
ANALYSIS METHOD: MEMB. FILT.
BACTI INTERPRETATION: UNSAFE
LAB SLIP #: 030869

SYSTEM NAME: MONROE WATERWORKS
COUNTY: GREEN CITY: MONROE
LOCATION DESCRIPTION: KORKY'S SERVICE STATION
SAMPLE TYPE: CHECK PREVIOUS UNSAFE: 10/17/78
ANALYSIS RESULT: 0 MFCC/100ML
DATE REPORTED: 10/25/78

FACILITY ID #: 123007830
DATE: 10/23/78
TIME: 14115
ANALYSIS METHOD: MEMB. FILT.
BACTI INTERPRETATION: SAFE
LAB SLIP #: 030854

SYSTEM NAME: MONROE WATERWORKS
COUNTY: GREEN CITY: MONROE
LOCATION DESCRIPTION: WELL#5
SAMPLE TYPE: REGULAR
ANALYSIS RESULT: 8 MFCC/100ML
DATE REPORTED: 10/25/78

FACILITY ID #: 123007830
DATE: 10/23/78
TIME: 15130
ANALYSIS METHOD: MEMB. FILT.
BACTI INTERPRETATION: UNSAFE
LAB SLIP #: 030841

SYSTEM NAME: REWEY WATERWORKS
COUNTY: IOWA CITY: REWEY
LOCATION DESCRIPTION: K&K STATION
SAMPLE TYPE: REGULAR
ANALYSIS RESULT: 1 MFCC/100ML
DATE REPORTED: 10/23/78

FACILITY ID #: 125008620
DATE: 10/18/78
TIME: 10100
ANALYSIS METHOD: MEMB. FILT.
BACTI INTERPRETATION: UNSAFE
LAB SLIP #: 030283

Figure A-12. Daily Exception Report
(used for first notification) State of Wisconsin

REPORT ID. 07/07/80 MILESTONE REPORT

DISTRICT COMMUNITY AND NON-COMMUNITY PWS TOTALS

PWF STATE REGION	TOTALS	PWF PLANT TYPE C	N	BLNK
BLANK	112	37	75	0
01	574	285	289	0
02	1,104	400	704	0
03	768	486	282	0
04	1,188	312	876	0
05	280	112	168	0
06	2,022	929	1,093	0
TOTALS	6,048	2,561	3,487	0
DETAIL LINES	7			

Figure A-13. TRC Milestone Report, State of Florida

BACT 2

WATER QUALITY COMPLIANCE SUBSYSTEM SCREEN 2
BACTERIOLOGICAL ANALYSIS INPUT

PWS-ID:① ------- PWS NAME:---------- ANALYSIS METHOD:MF②
PWS STREET:---------- CITY:----------
PWS STATE:-- PWS ZIP:-----
LAB-ID:③ --
LAB NAME:----------

SAMPLE TYPE KEY
C - CHECK P - PLANT TAP S - SPECIAL
D - REGULAR DISTRIBUTION R - RAW WATER

ANALYSIS RESULT	DEC	SAMPLE DATE	ANALYSIS DATE	*TYPE	SAMPLE TIME	LOCATION CODE	NAME
④		⑤	⑥	⑦	⑧	⑨	
----	-	------	------	-	----	---	----------
----	-	------	------	-	----	---	----------
----	-	------	------	-	----	---	----------
----	-	------	------	-	----	---	----------
----	-	------	------	-	----	---	----------
----	-	------	------	-	----	---	----------
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----	-	------	------	-	----	---	----------
----	-	------	------	-	----	---	----------
----	-	------	------	-	----	---	----------

TRANSMIT AFTER ENTERING YOUR LAST LINE OF DATA

Figure A-14. Interactive Terminal Input Screen - Bacti Samples
State of Florida.

FLUORIDE CONTENT
OF
MISSISSIPPI COMMUNITY WATER SUPPLIES

NAME OF WATER SUPPLY	CITY	ppmF*
ABBEVILLE WATER ASSOCIATION IN	ABBEVILLE	000.0
HURRICANE CREEK WATER ASSOC IN	ABBEVILLE	000.0
TURNER SPRINGS WATER ASSN, INC	ABBEVILLE	000.2
ABERDEEN WATER DEPT	ABERDEEN	***
COONTAIL WATER ASSOCIATION	ABERDEEN	000.2
WREN WATER ASSOCIATION	ABERDEEN	000.1
PANHANDLE WATER ASSOC	ACKERMAN	000.0
TOWN OF ACKERMAN	ACKERMAN	000.1
TOWN OF ALLIGATOR	ALLIGATOR	000.5
AMORY WATER DEPT	AMORY	***
CASON WATER ASSOC # 2	AMORY	000.1
CASON WATER SUPPLY	AMORY	000.2
HATLEY WATER DISTRICT	AMORY	000.1
ANGUILLA WATER DEPT	ANGUILLA	000.5
TOWN OF ARCOLA WATER DEPARTMEN	ARCOLA	000.4
ARTESIA WATER SYSTEM	ARTESIA	000.2
SNOW LAKE SHORES WATER SYSTEM	ASHLAND	000.1
TOWN OF ASHLAND WATER DEPT	ASHLAND	000.2
RIVERSIDE DEVELOPMENT ASSN INC	AVON	000.9
NORTH LAUDERDALE WATER ASSN IN	BAILEY	000.2
INGRAM WATER ASSN INC	BALDWYN	001.2
TOWN OF BALDWYN	BALDWYN	***
BASSFIELD WATER DEPT	BASSFIELD	000.0
GOOD HOPE WATER ASSOC	BASSFIELD	000.0
LOWLAND UTILITY	BASSFIELD	000.0
BATESVILLE WATER DEPT	BATESVILLE	***
CRYSTAL WATER CO	BATESVILLE	000.0
ENON LOCKE STA WTR ASSOC INC	BATESVILLE	000.2
INDEPENDENCE WATER ASSOC INC	BATESVILLE	000.0
J R MAJORS TRAILER PARK	BATESVILLE	000.0
MT OLIVET WATER ASSOC INC	BATESVILLE	000.0
T P ENTERPRISES DOGWOOD HILLS	BATESVILLE	000.0
CITY OF BAY SPRINGS	BAY SPRINGS	000.2
TALLAHALA W/A MOSSVILLE	BAY SPRINGS	000.3
TALLAHALA WATER ASSN-MONTROSE	BAY SPRINGS	000.2
TALLAHALA WATER ASSOC ANTIOCH	BAY SPRINGS	000.0
TALLAHALA WTR ASSN-GARLANDVILL	BAY SPRINGS	000.0
TALLAHALA WTR ASSN-MISSIONARY	BAY SPRINGS	000.1
TALLAHALA WTR ASSN-TED CLEAR	BAY SPRINGS	000.0
TRI-COUNTY WATER ASSOC NO 2	BAY SPRINGS	000.2
TRI-COUNTY WATER ASSOC NO 1	BAY SPRINGS	000.3
BAY ST LOUIS UTILITIES SYSTEM	BAY ST LOUIS	***
DIAMONDHEAD UTILITY CO #1	BAY ST LOUIS	000.4
MCDONALD REALTY INC-MORGAN PK	BAY ST LOUIS	000.5
PINEWOOD S/D	BAY ST LOUIS	000.3
SCAFIDIS WHEEL INN & TRAILER P	BAY ST LOUIS	000.5
TOWN OF BEAUMONT	BEAUMONT	000.2
LAKE PIOMINGO WATER ASSN.	BELDEN	000.2
BELEN WATER ASSN	BELEN	000.3
BELLEFONTAINE WATER ASSN	BELLEFONTAINE	000.6
BELMONT WATER WORKS	BELMONT	000.0
BELZONI WATER DEPT	BELZONI	000.1
PO BX 117	BENOIT	000.4
BENTON WATER DEPT.	BENTON	000.2
CENTRAL YAZOO WATER ASSN	BENTON	000.2
MIDWAY COMMUNITY WATER SYSTEM	BENTON	000.3
TOWN OF BENTONIA WATER DEPT	BENTONIA	000.2
TOWN OF BEULAH	BEULAH	000.5
ADAMS TRAILOR PARK	BILOXI	000.4
ANCIENT OAKS UTILITIES	BILOXI	000.4
AZALEA TRAILER LODGE	BILOXI	000.4
BAY WATERWORKS INC (CEDAR GROV	BILOXI	000.3
BEACH VIEW APARTMENTS	BILOXI	000.3
BILOXI WATER WORKS DEPT	BILOXI	000.0
BUD'S MOBILE HOME MANOR	BILOXI	000.3
CEDAR LAKE MOBILE HOME VILLAGE	BILOXI	000.4
CIRCLE H TRAILER PARK	BILOXI	000.4
COAST WATER WKS (LAURA ACRES)	BILOXI	000.3
COAST WATER WKS (OCEAN VIEW)	BILOXI	000.3
COAST WATER WORKS (GULF HILLS)	BILOXI	000.4

*part per million fluoride
***supplies with fluoridation programs

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Figure A-15. Flouridation Report, State of Mississippi

APPENDIX B

RELATION OF MSIS PROCEDURES AND REPORTS TO DATA MANAGEMENT NEEDS

APPENDIX B

RELATION OF MSIS PROCEDURES AND REPORTS
TO DATA MANAGEMENT NEEDS

In the following paragraphs, we discuss the relation of particular MSIS procedures and reports to the data needs of water supply management identified in Section III.

A. Administration of Water Supply Management

1. Access to Exhaustive Data on a Particular System

Various SELECT procedures in MSIS provide access to the data on the MSIS files PWF, PSF, SAF, VIF, SHF, VEF, EAF, and OMF. The Report PWSI.303 does present a clear picture of the inventory data on a particular water system. The violations file report exhibits data on a single compliance period, while what is needed is a summary over several compliance periods. Such a summary report could be produced using either the MSIS SELECT procedure on the entire VIF file or the Data Retrieval Subsystem. Some thought needs to be given to producing a single report summarizing the data on the more volatile files (VIF, for example) as well as listing all the data on the inventory file.

2. Summary Data on Arbitrary Fields of Interest Across File Lines

The Data Retrieval Subsystem, released in December 1979, was designed to satisfy this need.

3. Produce Required Federal and Regional EPA Reports

MSIS does produce the required Federal reports. It has been found, however, that MSIS files do not contain all the data needed to meet all the reporting requirements of the various EPA regional offices. Some adjustment, either of MSIS file contents, or of regional requirements, would be helpful.

The Data Retrieval Subsystem could then be used to summarize the apppropriate fields.

4. Ad Hoc Reports in Response to Public Inquiry or Special Need

The Data Retrieval Subsystem, released in December 1979, was designed to satisfy this need.

5. Status Reports on Activities

The Data Retrieval Subsystem should prove useful for such reports. The need for notification status is such that the development of special software might well be worthwhile. Some simple examples of such status reports already developed by New York and EPA Region III (Pennsylvania) are included in Figures A7 and A8 in Appendix A.

6. Time Trends

The Data Retrieval Subsystem, in concert with a statistical analysis package such as SAS, might be used on, for example, VIF or SAF to extract the needed data.

7. Mailing List

The mailing list produced by the OPER module (OPER.304) does not print PWS-ID on the labels, and the type of paper used is not universally available. Most states are developing their own software for producing mailing labels. The state of North Carolina, in particular, bases a very sophisticated data handling scheme within the state laboratory on a well-designed mailing label system.

8. Correlation Between Data on Water Supply Management Files and Outside Files

Special software would be needed to accept input from foreign files. If the Data Retrieval Subsystem could be adapted to accept additional input of arbitrary format, it would be very useful here.

B. Support and Surveillance of Water Supply Management

1. Summaries and Time Trends of Source Quantity and Quality

Some sample data from sources prior to treatment are currently kept on MSIS files. If more detailed information on raw water quality is required, the data would have to be included in the MSIS system or access provided to outside data bases (for example, in Environmental Water Quality files) containing this information.

2. Inventory Data Including Operational Data and Treatment Processes

Again, some data about operations and treatment processes are contained in the MSIS files. However, detailed information on, for example, well depths and casings and records of sanitary surveys, are not presently entered on these files. In order to produce such reports, modifications would need to be made to the MSIS file structures.

3. Mailing Lists

The mailing list produced by the OPER module (OPER.304) does not print PWS-ID on the labels, and the type of paper used is not universally available. Most states are developing their own software for producing mailing labels. The state of North Carolina, in particular, bases a very sophisticated data handling scheme within the state laboratory on a well-designed mailing label.

4. Operator Certification Data

A list of operators and their certification classification is available using OPERSELT. If the Data Retrieval Subsystem could be enhanced to include the OMF file, varied formats could be produced.

5. Records of Approvals of Engineering Plans

These data are not kept on the MSIS files.

6. Compliance Histories

Data from individual compliance cycles are reported by WAQCCOM 1, 2, 3, and 4, and WAQCVIFS, while a single system can be tracked through several compliance cycles using the SELECT procedure on the entire VIF file. Alternatively, the Data Retrieval Subsystem could be used to construct such a report.

7. Records of Previous Inspections and Sanitary Surveys

The PWF file is created and maintained with information gathered in sanitary surveys and inspections of public water supplies. However, not all data gathered in a sanitary survey are captured on PWF, and no record is produced showing changes in a system over time or approved engineering plans for the future.

8. Data on Lab Certification and Sampling Responsibility

The list of certified laboratories and their certification levels are produced by WAQCLBT and laboratory ID's can be entered on the PWF file for each contaminant group. However, records of a laboratory's agreed responsibilities to a particular public water system for sampling, etc., would have to be kept on PWF or elsewhere to produce reports relating public water systems to the laboratories they choose to use. The Data Retrieval Subsystem would not be of use here since it does not have access to the Laboratory Table (LBT).

9. Timely Record of Sampling Violations

MSIS does not address one of the most pressing data needs generated by the Safe Drinking Water Act--i.e., the need to notify systems and the state of MCL and monitoring violations within the required time frame. All MSIS compliance determination is done by the WAQC module, designed to be run in

batch mode once a month. Both the system software and the data entry process would require modification to produce such notification. In order to enter the necessary sample data into the system, interactive terminals or some equivalent system would need to be located in the laboratories. Special software would need to be designed to capture such data daily and produce the required listings, independently of the monthly compliance processing. These listings would then need to be made available (perhaps through onsite printing) to those responsible for notifying the public water supplies of sample results. The state-designed system in use in Wisconsin does provide such daily reports (See Figure A-12 in Appendix A). Modification of the compliance process to provide this notification would be a major undertaking, but, if it proved feasible, would provide a very valuable tool to the state water departments.

C. Compliance Determination, Recordkeeping, and Enforcement Actions

1. Well-Designed Input and Output Documents and Well-Documented and Efficient Procedures

There has been some complaint about the multiplicity of forms involved in the MSIS system. Various modifications have been implemented by the University of Cincinnati Computing Center working with the Users Support Group. Some simplification does appear possible; North Carolina, for example, has reduced the number of input forms to five. Design of documents needs to take into consideration both ease of coding and reading forms as well as physical constraints (for example, compatibility with typewriter carriages, and printing and transportation costs). The MSIS procedure documentation, while thorough, lacks good organization and badly needs indexing.

2. Efficient Procedures for Requesting Ad Hoc Reports and Scheduling Regular Procedures

This is a responsibility of water supply management.

3. Well-Designed File Structures and Maintenance Procedures

MSIS does effectively maintain the federally required files of inventory, variance and exemption, sample analysis, violations, and enforcement actions data. However, there has been criticism of the lack of flexibility in file formats, particularly in the Public Water File, needed for reflecting the variety of operating strategies of water supply management by the states. Redesign of PWF format is under consideration.

4. Report Generator to Satisfy the Variety of Inquiries

The recently released Data Retrieval Subsystem is designed to fill this need.

5. Good Data-Editing Capabilities

Users of the WAQC module have found the use of good data control and editing procedures essential to successful running of the compliance cycle. Some users rely on the use of dummy compliance of the PSF-SELECT procedure to identify problem records. As users gain experience with the forms and procedures of WAQC, more efficient methods should be developed by both the users and MSIS designers to minimize the amount of effort involved in preprocessing sample data.

6. Efficient and Effective Procedures for Determining Violations

The compliance module, WAQC, is currently proving operational in the hands of users in several states. The successful use of the module appears to require the presence of both a water program representative and a data processing analyst experienced in the use of MSIS and dedicated to ensuring

the smooth running of the system. Continual updating of the system software, with the introduction of yet new "bugs" does not contribute to user confidence in the module. In many states, a good deal of time is still spent in manually preediting the data and/or correcting keypunch errors. This problem increases in magnitude with the size of the water program. The use of alternative data entry procedures, such as interactive terminals or key-to-disk entry (both of which use formatted CRT screens with editing capabilities), might be worthy of consideration. As users gain confidence in the system and are able to tailor the output reports to their particular needs, WAQC is proving a valuable tool in the state water program. (Examples of such specially tailored reports are given in Figures A-5 through A-10 in Appendix A).

7. Timely Data on MCL and Other Violations

MSIS was not designed to give first notification of violations; yet, because of the requirements of the Safe Drinking Water Act, this is one of the most pressing needs of water supply management.

8. Status Reports

MSIS does not currently issue status reports, per se. Examples of reports on status of response to notification requirements are given by Figures A-7 and A-8 in Appendix A. Figure A-11 is an example of a status report on water supplies not surveyed. All three of these report formats were generated by state-designed software. The Data Retrieval Subsystem might be useful for such reports.

9. Efficient Procedures for Notification of Violations

Unless MSIS is modified to enable prompt determination of violations, the notification cannot be automated. At the present time, most states do this manually.

10. Tracking of Previous Enforcement Actions and Response of Water Systems

The current enforcement actions subsystem of MSIS appears to be aimed primarily at court actions, while the states try to keep such litigation to a minimum by a variety of alternate procedures. There is a serious need to track the response to all sorts of enforcement actions, from phone calls and letters to the more serious types. Some examples of simple report formats developed in New York and EPA Region III (Pennsylvania) are included in Appendix A. The Data Retrieval Subsystem could be of use here.

11. Access to Inventory, Variance and Exemption, and Previous Compliance Records

The Data Retrieval Subsystem, released in December 1979, was designed to satisfy this need.

12. Accurate Mailing List With Telephone Numbers

MSIS does not print a list of telephone numbers, but the Data Retrieval Subsystem could be used to produce such a list. (See also Section B.7. above).

APPENDIX C

INTERVIEW FORMAT

INTRODUCTION

Research Triangle Institute (RTI) is under contract to the U.S. Environmental Protection Agency (EPA) Office of Drinking Water to evaluate the Model State Information System (MSIS). The purpose of the study is to determine State Water Supply data management needs and how well MSIS is helping state agencies meet those needs.

Phase I of the work has been completed in which RTI prepared an evaluation plan. In Phase II of this study, RTI will be meeting with personnel in several states to determine the role played by MSIS in state water management.

It would be very helpful if we could talk personally with staff members who work closely with your information (data management) system, in particular with those responsible for implementing the Safe Drinking Water Act. In particular, we would like to meet with key personnel familiar with the following major activities (see Figure 1 for details):

- Management of state drinking water program for an overview of the state water supply management program needs and data management needs.
- Management of field staff to discuss field operations.
- Management of state laboratory to discuss laboratory operations.
- Compliance determination and enforcement--for a description of current compliance procedures.
- Management of data processing--for a description of your current data management system.

MANAGEMENT OF STATE WATER SUPPLY PROGRAM
- Administration (staffing, budgeting, etc.)
- Program Planning
- Establishment of Operating Procedures
- Evaluation of State Program

PROMULGATION AND MAINTENANCE OF LAWS AND STANDARDS
- Quality of Sources
- Drinking Water Quality
- Surveillance of Drinking Water Quality (sampling frequency, analysis methods)
- Design and Construction of Water Works Facilities
- Materials and Additives Standards
- Plumbing Codes
- Cross-Connection Control

SUPPORT OF PUBLIC WATER SUPPLY SYSTEM
- Health Education With Regard to Water Quality
- Training Programs for Operators, Supervisors, etc.
- Establishment or Certification of Laboratories
- Monitoring Laboratories' Equipment, Techniques, and Personnel
- Certification of Operators

MONITORING WATER SOURCES AND PUBLIC WATER SYSTEMS
- Monitoring Quality and Output of Sources of Drinking Water
  - Approval of Sources
  - Sampling and Monitoring of Sources
  - Protection of Watersheds and Reservoirs
- Monitoring Public Water System Management and Operational Methods
  - Maintaining an Inventory of Public Water Systems
  - Conducting Sanitary Surveys of:
    - Sources, Including Ground Water and Surface Water
    - Treatment Facilities, Including Equipment and Operating Practices
    - Distribution Systems, Including Location and Maintenance of Water Mains and Cross-Connections
    - Storage Facilities, Including Locations, Construction, and Maintenance
- Collection and Analysis of Water Samples
  - Distribution of Sampling Points
  - Sampling Techniques
  - Transportation of Samples
  - Coordination With Laboratories
  - Analysis of Water Samples

(Continued)

Figure 1. Water Quality Management Activities

COMPLIANCE DETERMINATION

- Processing Data from Water Works, Surveys, and Laboratories
- Determining Violations of Standards and Codes

ENFORCEMENT OF REGULATIONS AND STANDARDS AND REPORTING

- Enforcing Regulations Through Notification and Appropriate Actions
- Initiating Remedial Actions
- Fulfilling Reporting Requirements

Figure 1. Water Quality Management Activities (Continued)

QUESTIONS FOR WATER SUPPLY MANAGEMENT

1. Describe the scope of the water supply program in your state.
   a. What is the number of community supplies? Noncommunity supplies?
   b. How many labs are approved for sample analysis? How many state/county labs? How many private labs?
   c. How many samples per month enter the compliance cycle?
2. Describe the activities of state water supply management in terms of your goals. Use the accompanying list of activities (see Figure 1).
   a. Can you identify additional activities not on the list?
   b. Are there unnecessary activities on the list?
3. What information do you need to carry out each of these activities?
4. What resources are needed to carry out these activities?
   a. What are your current resources?
   b. What additional resources would you need to implement your goals?
5. What activities do you perform as manager of the state water supply system?
   a. What type of information do you need to carry out these activities?
   b. What proportion of your time is available for development and implementation of future goals?
6. Describe the reporting requirements of your EPA Region.
   a. Identify the reports and their purpose.
   b. How are these reports generated?
7. Describe your non-Federal (state or local) reporting needs.
   a. Identify the reports and their purpose.
   b. How are these reports generated?

8. How has the number of additional water systems identified by the Safe Drinking Water Act affected your data management needs?
9. What is your understanding of the role of a data management system in water supply management?
10. Describe your current data management system.
    a. How long has the state been using this system?
    b. Identify the personnel involved with the system.
    c. What are the components (modules) of the system?
11. What is your evaluation of your current data management system?
    a. For which activities are you using it?
    b. What are the limitations of your present system?
    c. How would you modify the system to support more fully these or additional activities?

QUESTIONS FOR COMPLIANCE DETERMINATION AND ENFORCEMENT

1. Describe the current compliance determination procedure.
   a. Is the procedure manual or automated?
   b. What activities are involved in compliance determination? (How do you make compliance determinations?)
   c. What kind of data are needed for compliance determination?
   d. What is the volume of data processed?
   e. Do you process raw data or summary data?
   f. How many personnel are involved in compliance determination?
2. How would you like to see current compliance determination procedures improved?
   a. What are the shortcomings of the present system?
   b. What data support do you need that you are not now receiving?
   c. What new activities would be involved, if any?
   d. What additional resources would be required to support these improvements?
3. Describe the kinds of enforcement actions you now take.
   a. What is the frequency of each?
   b. What is the volume of each?
   c. How are the enforcement letters, etc., produced?
   d. How many personnel are involved in enforcement activities?
4. Describe possible improvements to the enforcement procedure.
   a. What enforcement actions ought you to take that are not now taken?
   b. Would additional data or reports be required?
   c. Are additional resources needed?

QUESTIONS FOR MANAGEMENT OF FIELD STAFF

1. Describe the activities of the field staff. Use the accompanying list of activities (see Figure 2).
    a. Can you identify additional activities not on the list?
    b. Are there unnecessary activities on the list?
2. What information do you need to carry out each of these activities?
3. Describe the data needed for maintaining an inventory of the Public Water Systems.
    a. What data are presently collected?
    b. How much personnel time is involved in survey work?
    c. What data ought to be collected?
    d. How often are they or should they be updated?
4. Describe the procedures used in directing compliance sampling.
    a. How much time is spent in training and monitoring operator sampling?
    b. What are the procedures for handling the data generated?
5. Describe the present certification and training procedures.
    a. What activities are performed in these areas (certifying and training PWS operators or private lab personnel)?
    b. How much staff time is spent in certifying and training PWS operators or private laboratory personnel?
    c. What data management procedures presently support these activities?
    d. What improvements in data collection or processing would you recommend to improve these functions?

SUPPORT OF PUBLIC WATER SUPPLY SYSTEM

- Health Education With Regard to Water Quality
- Training Programs for Operators, Supervisors, etc.
- Establishment or Certification of Laboratories
- Monitoring Laboratories' Equipment, Techniques, and Personnel
- Certification of Operators

MONITORING WATER SOURCES AND PUBLIC WATER SYSTEMS

- Monitoring Quality and Output of Sources of Drinking Water
  - Approval of Sources
  - Sampling and Monitoring of Sources
  - Protection of Watersheds and Reservoirs
- Monitoring Public Water System Management and Operational Methods
  - Maintaining an Inventory of Public Water Systems
  - Conducting Sanitary Surveys of:
    - Sources, Including Ground Water and Surface Water
    - Treatment Facilities, Including Equipment and Operating Practices
    - Distribution Systems, Including Location and Maintenance of Water Mains and Cross-Connections
    - Storage Facilities, Including Locations, Construction, and Maintenance

Figure 2. Activities of Field Staff

QUESTIONS FOR MANAGEMENT OF STATE LABORATORY

1. Describe the activities of the laboratory. Use the following list of activities:
   - Selection of Distribution of Sampling Points
   - Sampling Techniques
   - Transportation of Samples
   - Coordination With Laboratories
   - Analysis of Water Samples.

   a. Can you identify activities not on the list?

   b. Are there unnecessary activities on the list?

2. What information do you need to carry out each of these activities?

3. To what degree is the state laboratory involved in compliance testing?

   a. What percentage of the laboratory's activities is devoted to compliance testing of public drinking water?

   b. How many personnel are involved?

   c. How is scheduling determined?

   d. Describe the control system for data in state laboratory. (Are sample bottles provided, etc.?)

   e. Describe procedure for entering data in compliance determination process.

      1) Are raw data or summary data entered?

      2) What method is used to enter data (manual, punched card, on-line entry)?

4. Describe laboratory activities other than compliance testing.

QUESTIONS FOR MANAGEMENT OF STATE LABORATORY (Continued)

5. Describe the involvement of private labs in implementing the SDWA.
   a. What percentage of compliance testing is done by private labs?
   b. Describe the procedure for handling data from private laboratories.
6. Describe your laboratory operation needs.
   a. What improvements would you recommend in your laboratory operation?
   b. What are the shortcomings of your present system?
   c. How can the data management system better support your laboratory operations?
   d. What additional resources would be required to implement these changes?

QUESTIONS FOR MANAGEMENT OF DATA PROCESSING

1. Describe the components of your water supply data processing system.
2. Describe the type of reports you are now generating. (Obtain copies if practicable.)
   a. How many different reports are you generating?
   b. Who uses these reports?
   c. How are they generated?
   d. What means are you using to generate alternate (ad hoc) reports?
   e. How are requests for reports initiated?
   f. How much DP time (personnel and computer) is spent processing each type of report?
3. Describe your input forms. (Obtain copies if practicable.)
   a. Who collects raw data?
   b. Who prepares the forms?
   c. How frequently are they prepared?
4. What are the strengths and weaknesses of your current system?

ADDITIONAL QUESTIONS FOR DATA PROCESSING IN STATES USING MSIS

1. To what extent were drinking water supply procedures automated before MSIS?
2. What is the stage of implementation of MSIS in this state?
   a. Which modules are used?
   b. Which files are active?
   c. For what activities are you using MSIS modules?
   d. For what activities are you using MSIS files?
3. What is the cost of implementing MSIS?
   a. How many personnel are involved?
   b. What was the cost of implementing MSIS in the past year?
   c. What is projected cost for next year?
4. Are you using MSIS input forms?
   a. Which forms have you redesigned, if any?
   b. Who contributed to the design of these forms?
   c. How are you interfacing these forms with the MSIS systems (preprocessing, altering MSIS program code, etc.)?
5. What alternative software are you using with MSIS files (report generator packages, in-house programs, etc.)?
6. Do you feel it will be necessary to alter MSIS program code or files?
7. How are you dealing with MSIS documentation?
8. What are the strengths and weaknesses of MSIS, as you see them?